# THE FOUNDRY

A TRADE JOURNAL

DEVOTED TO THE INTERESTS OF THE WHOLE FOUNDRY BUSINESS

Contents


FOUNDRY CRANES—Illust.—A. E. Outerbridge, Jr. ..... 473
NEW FOUNDRY ENTERPRISES ..... 483
EDITORIAL ..... 485
Trade Outlook—The Scrap Heap—Krank's Korner—Etc.
TROLLEY SYSTEM—Illust.—F. O. Farwell. ..... 486
MATTHEW ADDY ..... 490
CAST IRON NOTES—W. J. Keep. ..... 490
THE MANUFACTURE OF RAIDATORS—Illust—H. Hansen. ..... 492
PITTSBURG & VICINITY ..... 497
A FEW PENNSYLVANIA NOTES ..... 498
WESTERN FOUNDRYMEN'S ASSOCIATION ..... 499
FRANCIS W. GIBBY—Illust. ..... 505
POKEY'S POINTERS ..... 506
JAMES CHALMERS ..... 508
BURNING WOBBLERS AND NECKS ON ROLLS ..... 610
CORRESPONDENCE ..... 511
QUESTIONS AND ANSWERS ..... 512



AUGUST, 1896.

Vol. VII. No. 48.

Published Monthly by THE FOUNDRY PUBLISHING CO.

DETROIT, MICH.

ESTABLISHED 1879.

WE HAVE TAKEN ADVANTAGE OF SLOW BUSINESS THE PAST TWO MONTHS TO COMPLETELY OVERHAUL OUR PLANT, AND WILL START IN FULL TIME JUNE 1st.

# THE MOST COMPLETE CONCERN OF ITS KIND IN THE COUNTRY.

## Our Product will be in Quality

## EQUAL TO THE BEST,

## And our Prices will be the Lowest.

WHEN IN NEED OF ANYTHING
THE FOUNDER USES, EXCEPTING
ONLY METAL AND FUEL,
GET OUR PRICES.

Our Royal Plumbago Ad. Last month took well. Here are a few more bargains

Radiant Brand East India Silver Lead, Three Cents per Pound.

E. I. Ingot Mold Wash, Three Cents per Pound.

# The J. D. Smith Foundry Supply Co.

Foundry Equippers,
Manufacturers of
Foundry Facings,
Blackings and Supplies.

CINCINNATI, OHIO.
U. S. A.

REFINERS OF

PLUMBAGO

and Black Lead.

# THE BEST IS THE CHEAPEST

WHEN YOUR FOUNDRY INTERESTS
ARE TO BE CONSIDERED

WE MANUFACTURE

THE BEST

East India Plumbago
India Silver Lead
Founders Perfect Wash
Foundry Facings
Foundry Supplies.

TRIAL SAMPLES FREE.
ALL GOODS GUARANTEED.

## THE S. OBERMAYER CO.

CINCINNATI, O.

CHICAGO, ILL. LARIMER, PA. WHITE HAVEN, PA.

# Something New

Our Stamped Steel Hand Ladle is being rapidly adopted everywhere among **Malleable, Stove Plate and Bench Foundries** as being one of the greatest labor savers ever presented to the foundry trade.

It is much lighter, (weighs just One-Fourth as much as the old style cast iron Ladle.)

**Will Hold More Iron!**
**Will Not Crack!**
**Will Last Much Longer!**

And is so much Lighter that much of the drudgery of conveying iron is overcome. Send for sample.

## J. W. PAXSON & COMPANY,

**Pier 45.** **PHILADELPHIA, PA.**

# Whitehead Brothers Company,

DEALERS IN

# Molding Sand

FIRE SAND,
PHILADELPHIA SAND
FRENCH SAND,
FIRE CLAY, KAOLIN,
FOUNDRY FACINGS
and SUPPLIES
OF ALL KINDS.
LEAD FACINGS
A SPECIALTY.

**Albany Sand for Brass and Stove Plate Casting.**

*537=39 West 27th St.,*
*NEW YORK.*

**Providence Office,**
**42 S. Water Street.**

**Buffalo Office,**
**70 and 72 Columbia St.**

WORKS AT

CHEESEQUAKE CREEK, N. J.
SOUTH RIVER, N. J.
RARITAN RIVER, N. J.
SOUTH AMBOY, N. J.
WAREHAM, MASS.
CENTRE ISLAND, L. I.
WATERFORD, N. Y.
ALBANY, N. Y.
CEDAR HILL, N. Y.
COXSACKIE, N. Y.
CLINTON POINT, N. Y.
ATHENS, N. Y.
COEYMANS, N. Y.
WILLOW SPRINGS, N. Y.
POUGHKEEPSIE, N. Y.
CRESCENT, N. Y.

TRY OUR CRUCIBLES
THEY GIVE SATISFACTION
McCULLOUGH DALZELL COMPANY.
36 ST. & A.V.RY. PITTSBURG PA.

# SAND!

TO SAY THAT A MAN

# "HAS NO SAND"

is to refer to him in a decidedly uncomplimentary manner. Nearly as bad to say that his sand is no good. When referring to us, however, our friends—that is to say, our customers—always grow enthusiastic. . .

**THE REASON WHY**

We mine and ship more sand than any concern in the Eastern or Central States is simply because, when we get a customer once, he is ours for good. We see that he gets exactly what he wants and that it's free from every kind of impurity.

**SAMPLES AND PRICES GIVEN ON APPLICATION.**

**Twelve Years' Experience** In Mining and Shipping SAND and CLAY, enables us to ship you just what you need. We can send you any grade of MOLDING SAND you may require, from the finest to the coarsest, and guarantee quality always the same. Our No. 1 Sand has no superior that we know of for Stove Plate, Hollow Ware, Grey Iron and Malleable Castings; our No. 4 is the best Sand in use for Heavy Castings of any kind. It is an extra good wearer and is always sure to turn out a perfect casting. Our Crude Plastic Fire Clay is very refractory and guaranteed to work plastic readily in water.

## E. M. AYERS ✻ MARKET BLOCK, ZANESVILLE, O

Crucible.

ROBT. J. TAYLOR & SON

Crucible

Dipper.

Cover.

Stopper.

# Crucibles

For melting Steel, Brass, Copper, Gold, Silver, Nickel and Metals and Alloys of Every Description; Small Crucibles for making Assays and fine pure Plumbago for lubricating, etc.

We are practical workmen and have studied the requirements of the different metal works in this country, as well as in Europe. We also work strictly by chemical analysis, giving a uniformity at all times never before approached in this or any other country.

## We make All Sizes, from 8 oz. to 2 ton Capacity.

# ROBT. J. TAYLOR & SON,

1900 to 1916 CALLOW HILL STREET, PHILADELPHIA, PA.

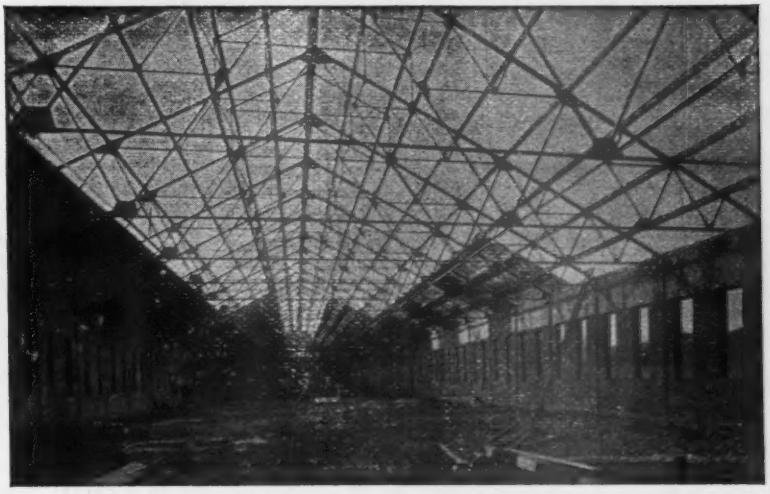
# Wrought Iron Bridge Co.,

DESIGNERS AND BUILDERS IN
IRON AND STEEL
FIRE PROOF BUILDINGS

FOUNDRIES, MACHINE SHOPS
—FOR—
ETC., ETC.

Exterior of Foundry of Warder, Bushnell & Glessner Co., Springfield, Ohio.

Traveling and Jib Cranes for handling
Heavy Castings and Machinery.



Buildings Designed for Special
Requirements.

Interior Foundry Building of Warder, Bushnell & Glessner Co., Springfield, Ohio.

The roof of this building was erected by the Wrought Iron Bridge Co., Canton, Ohio, and consists of steel trusses supporting wooden purlins to which matched and dressed sheeting is nailed for slating. Trusses being 18 ft. above the floor, the wood work of roof is out of danger from fire, while the cover being of slate a suitable cornice to protect the overhanging of roof from flying sparks, or heat from the burning of neighboring buildings, renders this structure absolutely fire proof, Windows are set in the sides of ventilator throughout its entire length, so that ample light and ventilation is insured.

## Wrought Iron Bridge Co.

ADDRESS NEAREST OFFICE.

CANTON, O. KANSAS CITY, MO. CHICAGO, ILL.

136 Liberty St., NEW YORK.

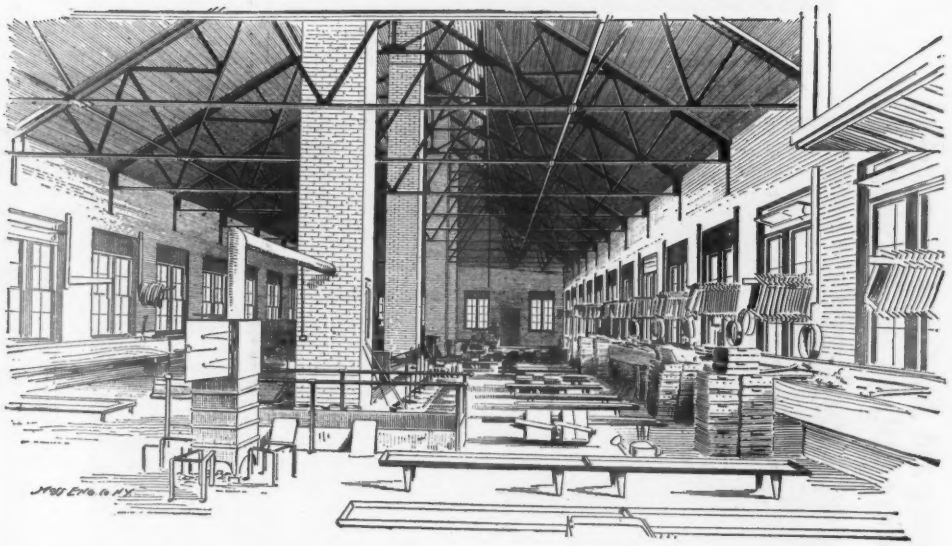
CHAS. M. JARVIS, President and Chief Engineer. BURR K. FIELD, Vice-President.
GEO. H. SAGE, Secretary F. L. WILCOX, Treasurer.

# THE BERLIN IRON BRIDGE CO.,

## ENGINEERS, ARCHITECTS

—AND BUILDERS OF—

## Iron and Steel Bridges, Roofs and Buildings.



The above illustration is taken direct from a photograph and shows the interior construction of a Brass Foundry designed and built by us for Edward Miller & Co. at Meriden Conn. The building is 46 feet in width and 112 feet in length, with an iron roof. Ventilation is secured by one of our improvnd ventilators on the ridge, with Corrugated Iron Shutters opening and closing by cords from the floor.

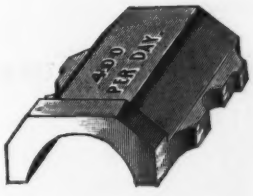
## Office and Works, - - EAST BERLIN, CONN.

SEND FOR ILLUSTRATED CATALOGUE.

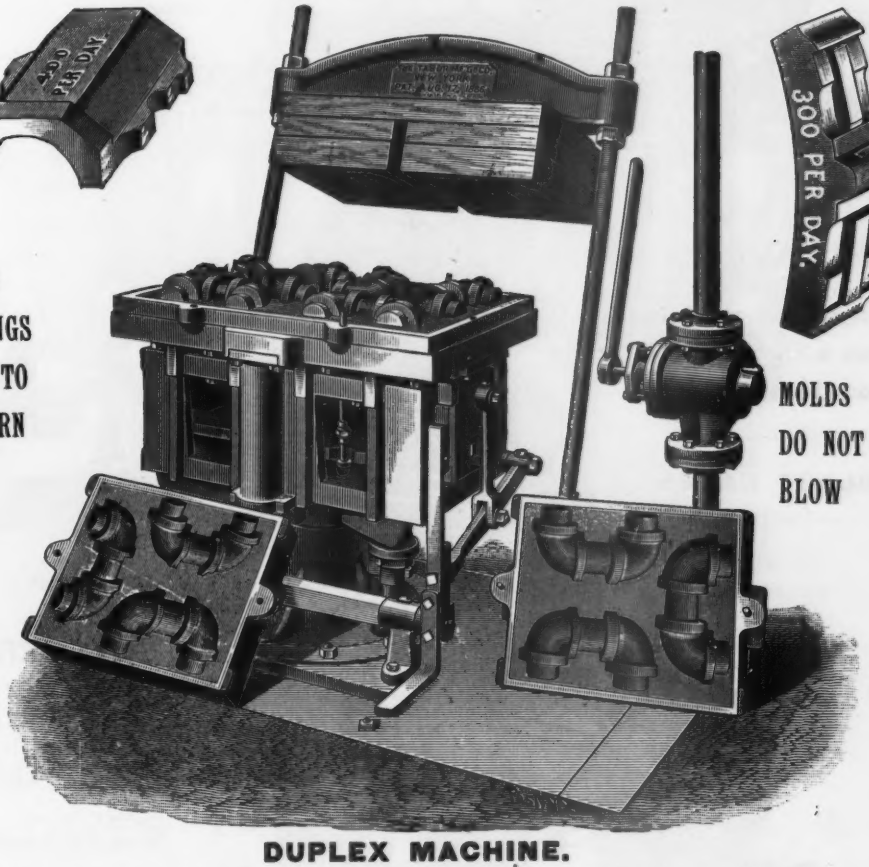
# ONE MAN'S WORK

—WITH THE—

# TABOR AUTOMATIC MOLDING MACHINE



POURS CASTINGS TRUE TO PATTERN



MOLDS DO NOT BLOW

**DUPLEX MACHINE.**

Molds both parts of flask at one operation of machine, thus making two machines in one.

These machines are adapted to general castings when made in reasonable quantities.

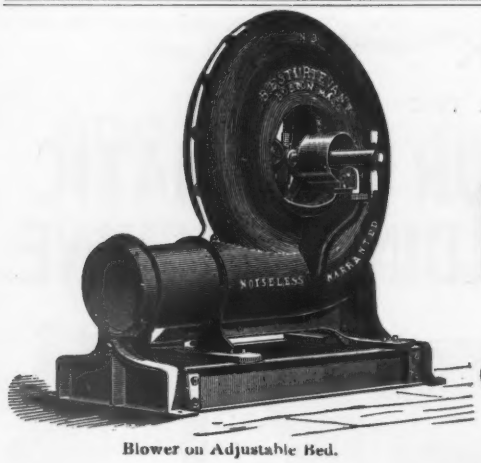
The use of these machines is a guarantee of economy, greater quantity and better quality in castings.

Foundrymen who are interested in producing cheap castings of superior quality are invited to correspond with the Company and call at the works, Front and Franklin Streets, Elizabeth N. J., and see the machines in operation.

## The Tabor Manufacturing Co.

OFFICE AND WORKS—
FRONT AND FRANKLIN STS.

Elizabeth, N. J.




Blower on Adjustable Bed.

# THE STURTEVANT STEEL Pressure Blowers,

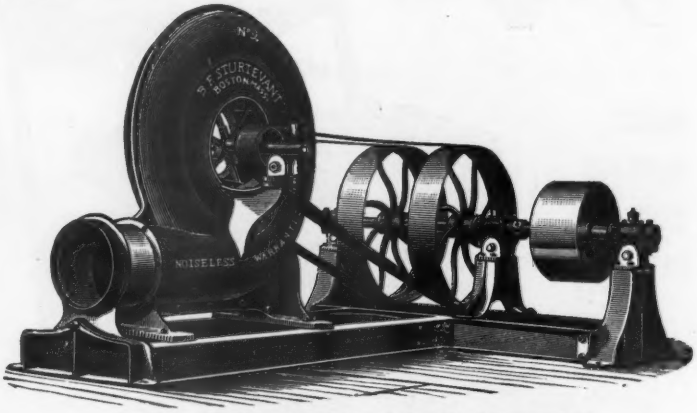
—FOR—

Cupola Furnaces and Forge Fires.

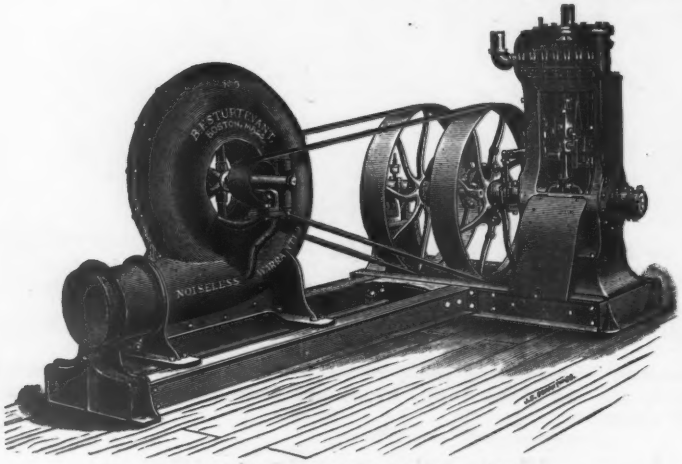
## BLOWERS

Furnished without Bed with Separate Countershaft

## BLAST GATES




Blower on Adjustable Bed with Combined Countershaft.




Blower on Adjustable Bed with Double Enclosed Engine.

## BLOWERS

WITH

## THE STURTEVANT

Direct Connected

## Electric Motors

Send for Catalogue.

## B. F. STURTEVANT CO.,

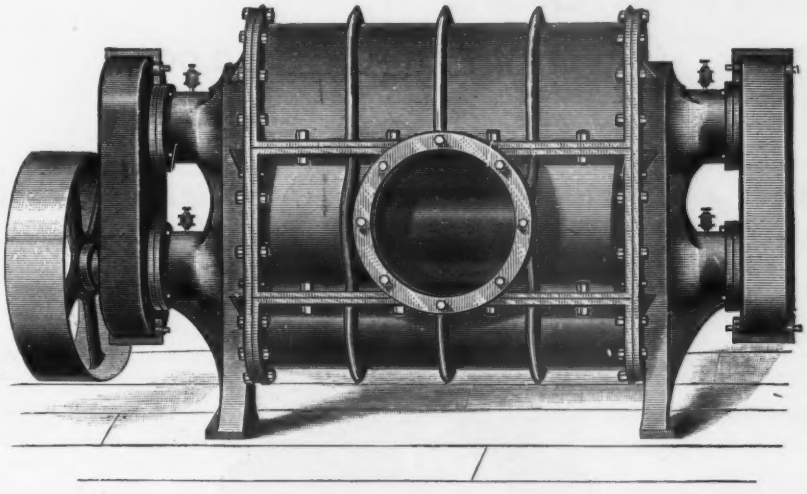
**BOSTON, MASS.**

91 Liberty Street, NEW YORK. 135 N. Third St. PHILADELPHIA.
16 S. Canal St. CHICAGO. 75 Queen Victoria St. LONDON.

STOCK CARRIED AT BRANCHES.

# The Green Rotary Pressure Blower

## GIVES THE MOST AIR FOR A $.



Working parts are two perfectly balanced impellers, mounted on the best steel shafts, running in bronze bushes, cut gearing at both ends of the Blower enclosed in oil-tight casing.

Weighs less, occupies less space, costs less for freight than any other POSITIVE BLOWER in existance.

## GIVES THE MOST AIR FOR A $.

**SEND FOR CATALOGUE.**

# Wilbraham Baker Blower Co.,

**2518 Frankford Ave., PHILADELPHIA, PA.**

P. G. COCHRAN, Pres. JOHN H. WURTZ, Secretary
J. R. LAUGHREY, Treas. J. S. NEWMYER, Mgr.

# Washington Coal & Coke Co

(CAPITAL PAID-UP $250,000.)

MANUFACTURERS OF

## HIGH GRADE COKE

We Make a specialty of 72 Hour
Foundry Coke.

N. P. HYNDMAN, Sales Agent,

Room 8, Conestoga Building, 7 Wood St.

General Office, DAWSON, PA. PITTSBURG, PA.

# DIRECTORY OF LEADING PIG IRON DEALERS.

**HUGH W. ADAMS & CO.**

Pig Iron Merchants

15 Beekman Street, NEW YORK

Boston Office, 85 Water Street

---

**HENRY H. ADAMS & CO.**

(Incorporated)

PIG IRON

Sole Agents for the Celebrated "NORWAY," for combined Strength and Softness.

177 Broadway,
NEW YORK CITY, N. Y.

---

**MATTHEW ADDY & CO.**

CINCINNATI, ST. LOUIS.

Agencies,

Chicago, Detroit, New York,
Philadelphia.

---

**THE DOMHOFF & JOYCE CO.**

PIG IRON COMMISSION,

CINCINNATI.

---

**CLINTON IRON & STEEL CO.**

Manufacturers of the
CLINTON INSPECTED FOUNDRY IRON
CELEBRATED "CLINTON" SOFTENER
PITTSBURG, PA
15 Cortlandt St., NEW YORK.

---

**DAYTON COAL & IRON CO.**

(Limited.)

PIG IRON.

DAYTON, Tenn. CINCINNATI, Ohio.

---

**F. A. GOODRICH & CO.**

Incorporated

PIG IRON, STEEL, COKE, ETC.

Detroit, Mich.

---

**THE MARSHALL IRON**

An old fashioned Pennsylvania Iron for high grade machinery.

The Juniata Furnace & Foundry Co.

Beach & Marlborough Sts.,

C. T. Holbrook, Sole Agent. PHILADELPHIA.

---

**MILLER, WAGONER & BENTLEY,**

PIG IRON.

Steel, Ore, Coke and Cinder.

Long Distance Telephone No. 842. COLUMBUS, OHIO.

---

**PICKANDS, BROWN & CO.,**

Manufacturers, Importers and Dealers in

PIG IRON AND IRON ORE.

Rookery Building, CHICAGO.

---

**ROGERS, BROWN & CO.**

CINCINNATI, CHICAGO,
BUFFALO,
PHILADELPHIA, NEW YORK,
ST. LOUIS

JOHN J. SHIPHERD, Pres. W. RUSSELL, Vice-Pres. and Mgr.
L. C. SHIPHERD, Sec'y and Treas.

THE

# Phoenix Iron Works Co.

**The following is a letter which was sent to us unasked for and is a sample of many genuine indorsements which we receive very frequently.**

OFFICE OF
BERT. L. BALDWIN, M. E.
CINCINNATI, O.

PHOENIX IRON WORKS CO.
CLEVELAND, OHIO.

GENTLEMEN—As you may remember, you furnished a 10 ton traveling Crane which was erected at the Cummingsville Generating Station for the Cincinnati Street Ry. Co. This crane was erected for the purpose of handling the heavy parts of the Railway Generators. The easy working of this crane was appreciated by the party, who had the contract for erecting the generator, who found that where it required eight men at the hoisting chain of one of our other cranes, it only required three at your crane, with both cranes handling the same load. All of the details on this crane are well worked out and substantial, so that I expect that it will continue to give us the best satisfaction.

Yours respectfully,
(Signed) BERT L. BALDWIN.

MANUFACTURERS

## Hand, Steam, Belt, Hydraulic and Electric Cranes

FOR ALL PURPOSES.

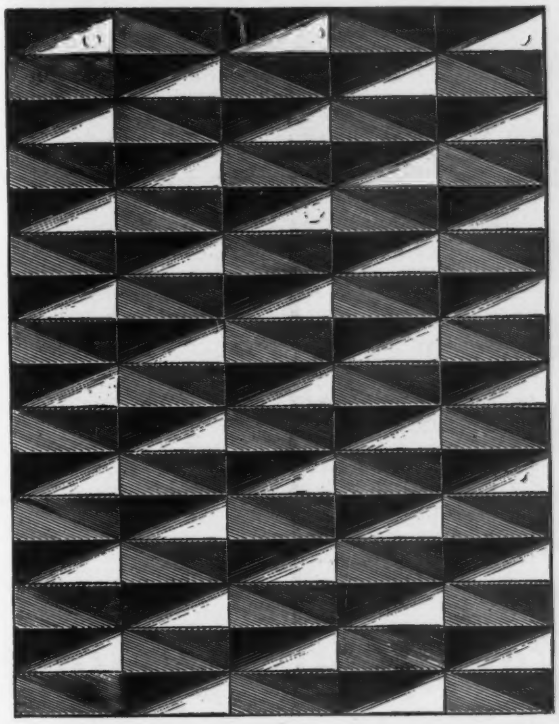
## Foundry Ladles, Chains, and General Machinery

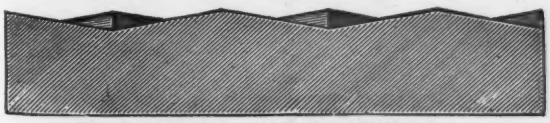
WASON STREET.

CORRESPONDENCE SOLICITED.
WRITE FOR CATALOGUE.

CLEVELAND, OHIO.

Eastern Office: HARRY W. JENNING, Agt., Fulton and Cliff Sts. NEW YORK, N. Y.
New England Office: THE JOHN WALE CO., 139 and 141 High St. BOSTON, MASS.
CHICAGO OFFICE, 1430 OLD COLONY BUILDING.





The above cut shows exact size of Diamonds.

# Diamond Pattern Lumber,

—FOR—

**DOOR SILLS, PLATFORMS, STEP PLATES, Etc.**

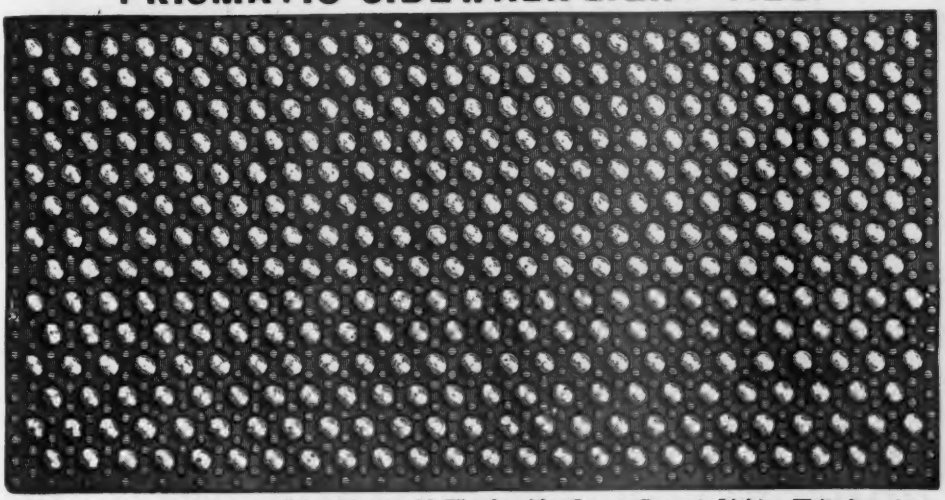
This Patent Lumber is made by a Special Machine invented by us, the ONLY Machine of its kind, and each piece will match PERFECTLY with all other pieces, by "joining" the edges to the centre, lengthwise, or any row of Diamonds.

Size of each piece, 8 feet long by 6 inches wide, and ⅛ inch thick. Price 10 cents per running foot of 6 inches in width, NET CASH crated and delivered f. o. b. Chicago, in orders of not less than 6 pieces. Send for sample.

**BROWN BROS. MFG. CO.**

Cor. Clinton and Jackson Sts. Chicago.

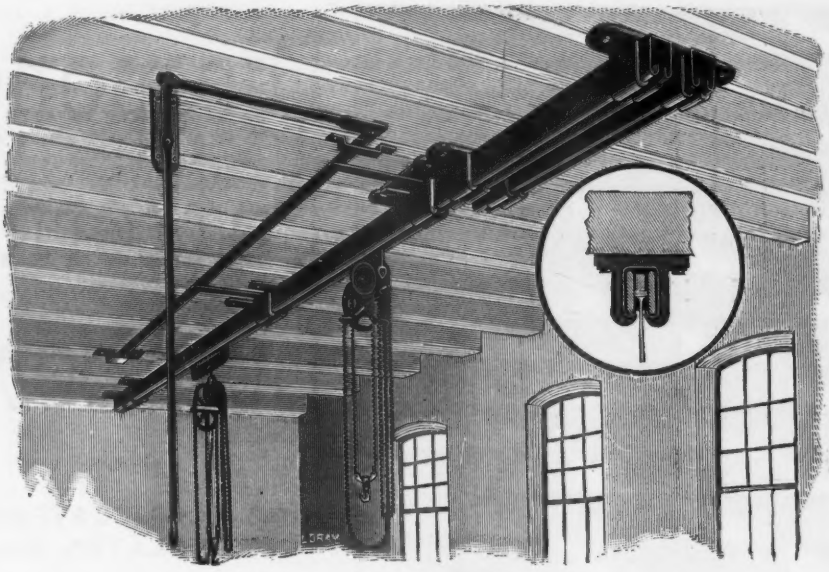
## PRISMATIC SIDEWALK LIGHT TILE.



Make your own frames and we will furnish you with Tiles for either Iron or Concrete Lights. Write for prices.

**BROWN BROS. MFG. CO.,**

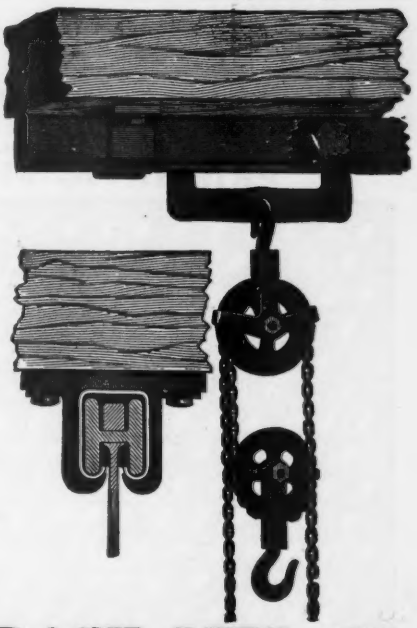
Mention THE FOUNDRY. **Cor. Jackson and Clinton Sts. CHICAGO.**



THE PATENT

# Overhead Trolley Track System

Is the coming improvement in the iron foundries of this country and in many cases can be made to pay for itself in a few months.



## Just the thing for

Carrying Iron from Cupola to Floors.
Carrying Castings from Floors to Cleaning Rooms. . . . .
Lifting, Rolling or Moving Flasks. .

All who have adopted this system have expressed themselves as being delighted with it.

*Write us for Circulars, Estimates and Full Particulars.*

# COBURN TROLLEY TRACK MFG. CO.

HOLYOKE, MASS.

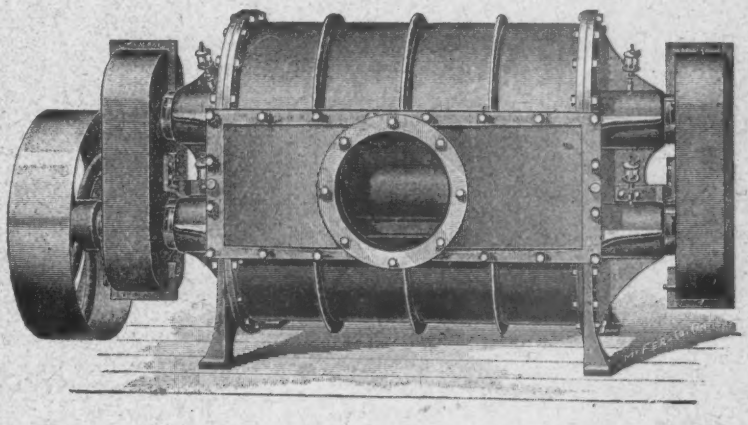
OVER

**25,000**

# ROOTS' POSITIVE PRESSURE BLOWERS

Have been put on the Market.

1859



1896

## They are Unequaled.

**P. H. & F. M. ROOTS CO.**

CONNERSVILLE, IND.

# Just Enough Wind

∴ ∵ ∴ and at the right pressure for the best results is what you obtain with a

# ROOTS' POSITIVE PRESSURE BLOWER

OUR CATALOGUE is interesting.
OUR TESTIMONIAL SHEET convincing.

## WRITE FOR THEM

**NO PERIODICAL BREAK-DOWNS AND EXCELLENT SATISFACTION.**

ELGIN, ILL., March 11, 1895.

P. H. & F. M. ROOTS CO., Connersville, Ind.:

*Gentlemen*—We very much regret our tardiness in replying to yours of the 25th ult., but now take occasion to say that we have had in use for a number of years, two No. ½ and one No. 6 Roots Blowers; the last named, replacing a —— Blower, which had caused us considerable annoyance by periodical break-downs. All of the machines are now in operation and are giving excellent satisfaction.

Yours truly,
ELGIN NATIONAL WATCH CO.

**THEY ARE OPERATING TO OUR ENTIRE SATISFACTION.**

LOUISVILLE, KY., April 16, 1895.

P. H. & F. M. ROOTS CO., Connersville, Ind.:

*Gentlemen*—Replying to your favor of the 12th inst., would say that we have three of your blowers now in use. They are without engine. We take pleasure in writing that they are operating to our entire satisfaction.

Yours respectfully,
DENNIS LONG & COMPANY,
By A. F. Callahan, Sec'y and Treas.

**WE HAVE BEEN, PRACTICALLY, AT NO EXPENSE WHATEVER FOR REPAIRS.**

SCOTTDALE, PA., April 27, 1895.

P. H. & F. M. ROOTS CO., Connersville, Ind.:

*Gentlemen*—The No. 6 Blower, with engine combined, which we purchased from you in November, 1889, continues to give good satisfaction. With this Blower and a No. 10 Colliau cupola, we are now melting from sixty-eight to seventy tons of iron per day, and have no trouble whatever in getting sufficient blast just when wanted. We have been, practically at no expense whatever for repairs on the Blower and only a moderate expense on the engine.

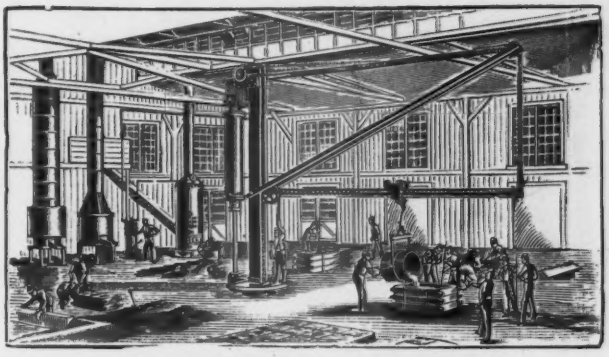
Yours respectfully,
NATIONAL FOUNDRY AND PIPE WORKS,
J. D. Hill, Secretary.

# P. H. & F. M. ROOTS CO.

Connersville, Ind

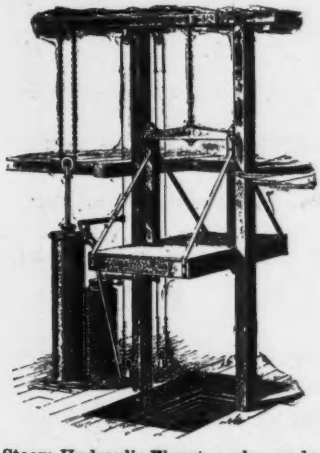
# WHY DIDN'T THEY NOMINATE THIS CRANE

If they want more money? The Ridgway Crane is a Money Maker from the word "go." A regular inflationist. If you don't believe it ask the folks who have it and whose bank accounts it is inflating every day even in these hard times. No theory about this Crane. A practical thing, as your investigation will show you. The temptation is strong, we know, but don't waste your time arguing something you don't know much about with some wind-bag who knows even less than you do. A nation's money is one of the deep things of earth. requiring accurate knowledge and long and patient study.



5-ton Steam-Hydraulic Crane in a Foundry.

Instead of this, get on your store clothes and go around and look into Ridgway Cranes. Find out if Ridgway is telling the truth when he says **his Crane makes two Molders do as much Work as Three.**



Steam-Hydraulic Elevator, also made direct acting with cylinder under platform.

You are not a statesman. You are a business man, and if there is a saving to be made anywhere in your business, you want to know it and know it mighty quick too.

No matter what money may be, Gold or Silver, to get any of it you have to travel down to that grimy old shop every day and watch, and manage, and "figger," and contrive to keep the costs down below the selling prices. Hence you need to know all about the Ridgway Crane, for the other fellows are getting them if you are not.

The Ridgway Crane often means the difference between doing business for Glory and doing business for Bread and Butter (not to speak of Pie.) If you are not spending your days in the Dirt and Grime of Iron Works for your health, take our midsummer advice and look into the Ridgway Balanced Steam-Hydraulic Crane.

## "PLEASE TAKE THE ELEVATOR."

**The Best Foundries are getting this Best Stock Hoist.**

## CRAIG RIDGWAY & SON, COATESVILLE, PA.

# THOUSANDS OF DOLLARS

Are thrown away annually by Foundrymen who overlook the great waste that occurs in the amount of Iron that is cast away with cinders.

Tumbling Barrels save a great deal, but still many foundries throw away a great number of tons in the course of a year.

Here is what one well-known concern that has used our Separator for many years has to say of it:

*Griffin Wheel Company,*

*Car Wheels of every description,*

*Chicago.*

Dec 6th.,1895.

The Audubon Machine Works,

41 Whitney Bldg., New Haven, Conn.

Gentlemen:-

We are in receipt of your favor of the 2nd. inst. The Separater Machine recently purchased of you does not replace the one of your make which we have in use here, but is to be put into service by us at our Denver Plant. We, however, consider the machine satisfactory in all respects and have no objection to giving you a testimonial to that effect.

Yours truly,

IN YOUR REPLY REFER TO.....

GRIFFIN WHEEL COMPANY,

R. Hotmann

Secretary.

It will pay for itself in a short time, and afterwards it will start to pay you.

# THE AUDUBON MACHINE CO.

**NEW HAVEN, CONN.**

# The Edw. P. Allis Co.

Milwaukee, Wis. have the largest foundry (exclusively for machinery castings,) in the United States. Its interior is shown by the following cut. . . . .

The daily melt is from 60 to 90 tons. All the heavy work is done under and handled by **THREE** thirty ton

# Shaw Electric Traveling Cranes,

The first of which was put in operation in 1889, the second in 1891 and the third in 1893. Besides these, there are three more Shaw Cranes in the erecting and machine shops.

**These Crane are Made Only by**

# THE SHAW ELECTRIC CRANE CO.

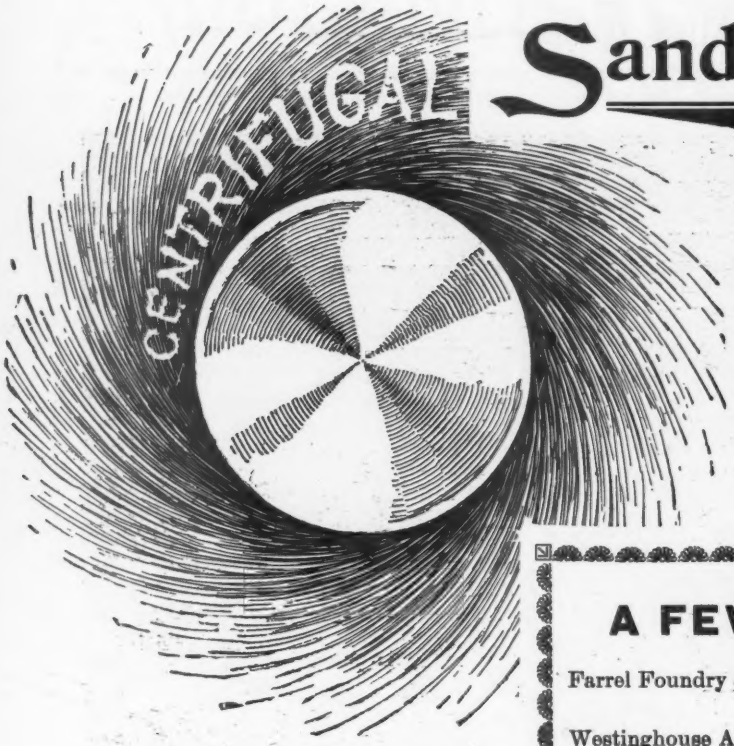
**MUSKEGON, MICH.**

**——And Sold Only by——**

## Manning, Maxwell & Moore,

**424 TELEPHONE BUILDING, PITTSBURG.**

**60 S. CANAL ST., CHICAGO, ILL.** **111 LIBERTY ST., NEW YORK.**




# Sand Mixer

IT IS
EFFECTIVE.
EXPEDITIOUS
ECONOMICAL

IT SAVES
TIME
LABOR
MONEY

A new, simple and practical method of **preparing Sand for Molds or Cores,** superseding the old time methods of drying and riddling. Damp Sand is in just the proper condition for working.

The saving in labor alone soon repays the cost of the apparatus.

---

**The apacity** depends entirely upon the facilities for feeding sand into the hopper, this may exceed 10 tons an hour. Two men will easily shovel 5 tons an hour by hand into the machine. One handling is, in ordinary work, all that is requisite.

## A FEW USERS:

Farrel Foundry & Machine Co.,
Ansonia, Conn.

Westinghouse Air Brake Co.,
Wilmerding, Pa.

I. P. Morris & Co.,
Phila., Pa.

McConway & Torley Co.,
Pittsburgh, Pa.

Deane Steam Pump Co.,
Holyoke, Mass.

Erie Malleable Iron Co.,
Erie, Pa.

E. Chicago Foundry Co.,
E. Chicago, Ind.

Maher & Flockhart,
Newark, N. J.

Murray Iron Works Company,
Burlington, Iowa.

Newport News Iron and Brass Works,
Newport News, Va.

*William Sellers & Co., Incorp.*

**PHILADELPHIA.**

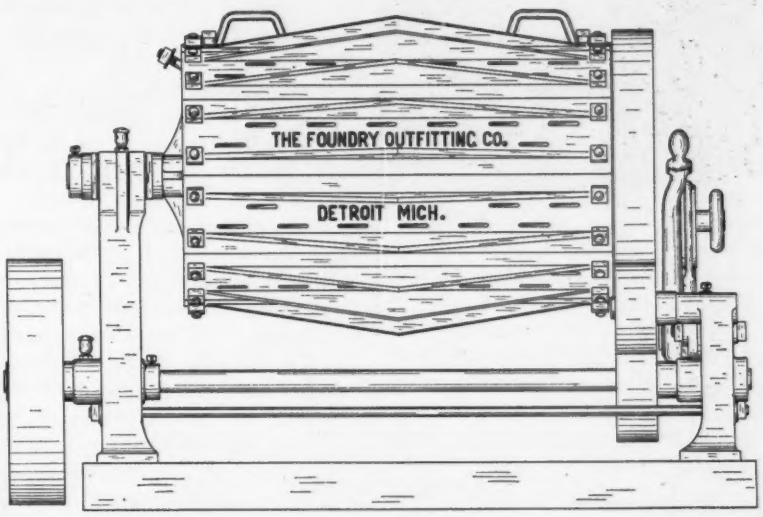
Cupola Furnaces
Blowers
Cranes
Compressors
Hoists
Elevators
Foundry and
Core Oven Cars
Ladles
Reservoirs

*The Latest*

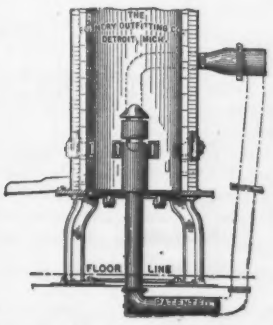
... IS OUR

New **Friction Mill**

It embodies all the very latest im-
—provements in that line. Easy to operate. Uses very
—little power. A number of them can be run on the
—same shaft, using only one belt. It can be started or
—stopped in a moment by lever shown in cut.




Tumbling Mills
Core Ovens
Sand Sifters
Brass Furnaces
Testing Machines
Trolley Tracks
Foundry Lights
Flasks
Fire Brick
Fire Clay
Molding Sand



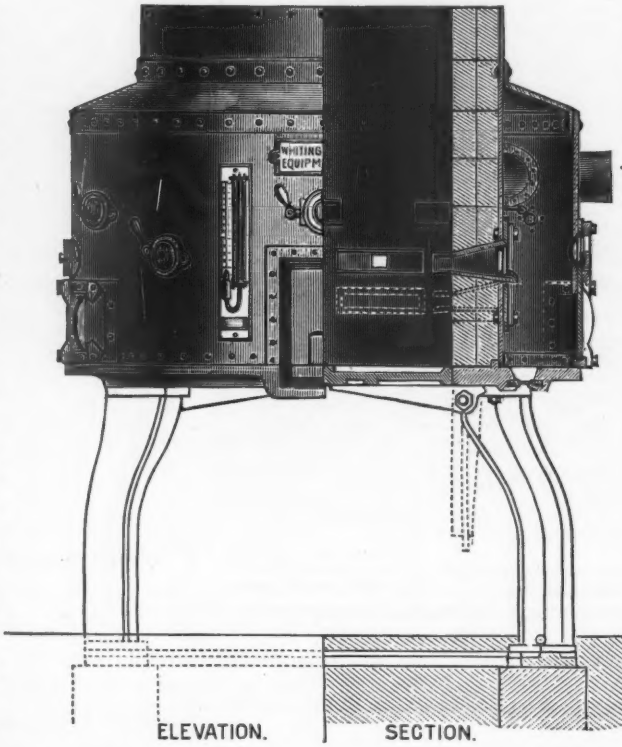

**The Center Blast Cupola**

**IS STILL ON TOP!**

**The Foundry Outfitting Co.**

**DETROIT, MICH.**

# COMPLETE
# FOUNDRY EQUIPMENT




Ladles
Trucks
Elevators
Tumblers
Sand Sifters
Turn Tables

## The Whiting Cupola.

ADOPTED by over three hundred high-class Foundries. Unexcelled for fuel economy and all-round efficiency. A rapid melter. Saves lining. Gives hot iron. No experiment—an established success. Fourteen sizes. Send for circulars and our new prices. A good time to buy.

IMPROVED

## Air Hoists and Cranes

"TYPE A" Hoist, for Foundry use, has an adjustable speed valve. The load may be held under pressure in any position. Patent exhaust attachment. Safety check. All sizes. Send for prices and circulars.

## Whiting Foundry Equipment Co.

WORKS: Harvey, Ill. CHICAGO OFFICE: 1522 Monadnock Block.

# THE FOUNDRY

VOL. 7. DETROIT, MICH., AUGUST, 1896. No. 48

## † Foundry Cranes.

By A. E. OUTERBRIDGE, JR.

We may readily believe that one of the earliest necessities of the primitive founder was form of apparatus for handling his heavy materials, and crude appliances for this purpose are known to have existed from a very early period. It may, however, surprise those who have not investigated the subject historically to learn that records are extant showing that even the Egyptians possessed elaborately constructed derricks and other hoisting appliances.

A gentleman who recently returned from an extended tour in that land of antiquity informed me that one of the most interesting places he visited while in Egypt was a large chamber, or vault, in the interior of one of the pyramids which contained the sarcophagus of the king who caused its construction.

The walls of this room were lined with large slabs of stone upon which were carved, in low relief, hundreds of figures, illustrat ing the method of constructing the pyramid, including the quarrying of the stone. Although my friend is not a mechanic, he said that the representations of derricks and other apparatus, with winches, ropes, etc., for hoisting and moving the large stones, resembled many of the appliances for similar uses which may be seen in parts of Europe even at this day.

These carvings are more than four thousand years old, and are as sharply defined as when fresh from the graver's tool; even the original faint tracings of the artist could be detected in some instances.*

Coming down to a comparatively modern period, interest is attached to the illustration on page 482, being a photograph of an ancient drawing of a crane devised by an English mechanic, Mr. Pinchbeck, which was examined by a committee of the Society of Arts of London, and to which the society's gold medal was awarded in the year 1767. Such a crane would excite attention as a novelty, even at this day. This picture will serve to establish the "state of the art" at that date and afford a starting point for a brief survey of the ground which has been covered in the part century, but more especially within the past decade.

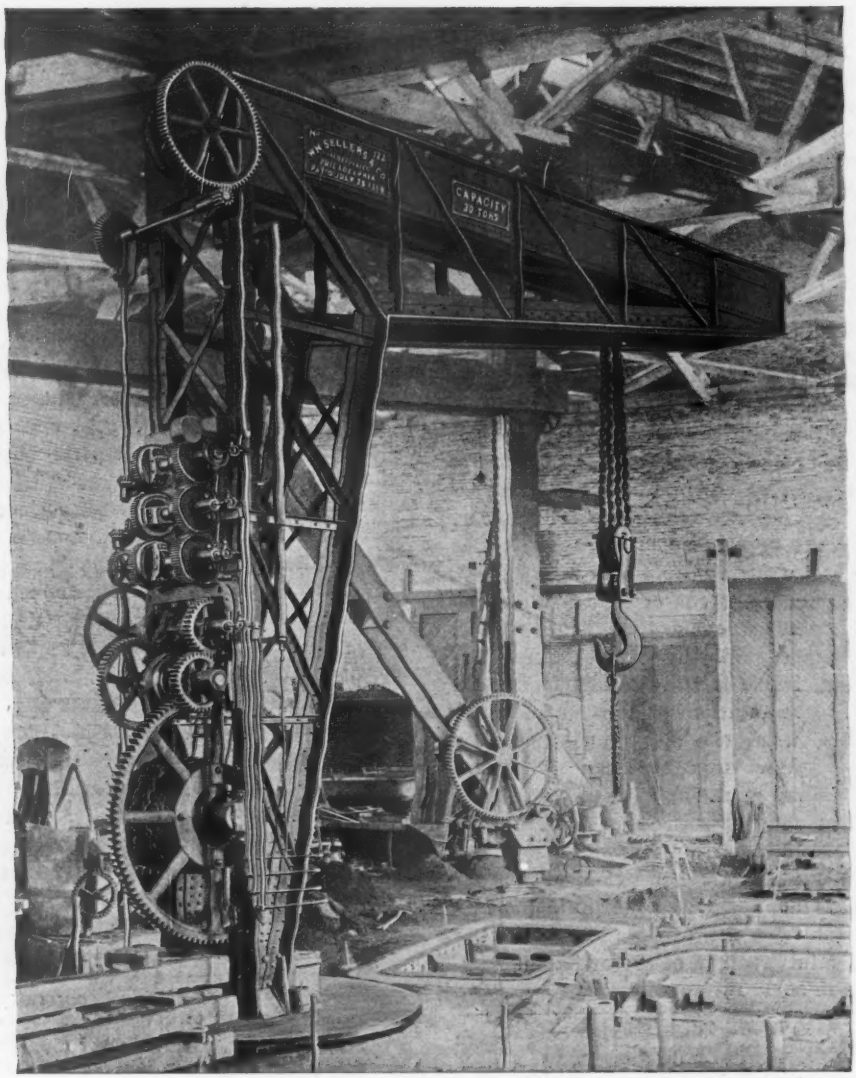
I find that while there are many references to cranes in text books on mechanics there is almost no literature devoted exclusively to this subject, and the ephemeral magazine articles, which appear from time to time, are mainly descriptions of new special apparatus. The impression might be gained from a perusal of these papers that the "swing" or "jib" crane is now almost obsolete, having been superseded by the modern "traveling crane.' There are two erroneous impressions contained in such a conclusion; first, the jib crane is by no means obsolete, nor is it likely to become so in our day; second, the traveling crane is not so novel an appliance as many mechanics suppose. Overhead travelers were constructed and erected in at least one machine shop more than forty years ago, and have been continuously and successfully operated ever since that time.

It is true that the constantly increasing magnitude of engineering constructions and

† Read at the meeting of the American Foundrymen's Association, Philadelphia, May 12th.

*Mr. Ferguson, in his History of Architecture (vol. I, pp. 91-92), says: "No one can possibly examine the interior of the great pyramid (Cheops) without being struck with astonishment at the wonderful mechanical skill displayed in its construction. The immense blocks of granite brought from Syene, a distance of 500 miles, are polished like glass, and so fitted that the joints can scarcely be detected. Nothing can be more wonderful than the extraordinary amount of knowledge displayed in the construction of the discharging chambers over the roof of the principal apartment, in the alignment of the sloping galleries, in the provision of ventilating shafts, and in all the wonderful contrivances of the structure. . . . . Nothing more perfect mechanically has ever been erected since that time."

the need of economy of time and labor in handling heavy materials used in such constructions has stimulated invention and has produced improvements in design and construction, which have enormously increased the efficiency of traveling cranes and have caused them, in many instances, to supersede the swing cranes, which are more limited in their sphere of action. On the other hand, there are many situations which are not well adapted to the economical use of travelers, where "jib" or "swing" cranes are more advantageous, and will, therefore, continue to be used; but, when we compare the modern improved high-speed jib crane—having a light wrought-iron frame, safety clutches, electric motor, and other novel appliances—with the cumbersome, old-fash-



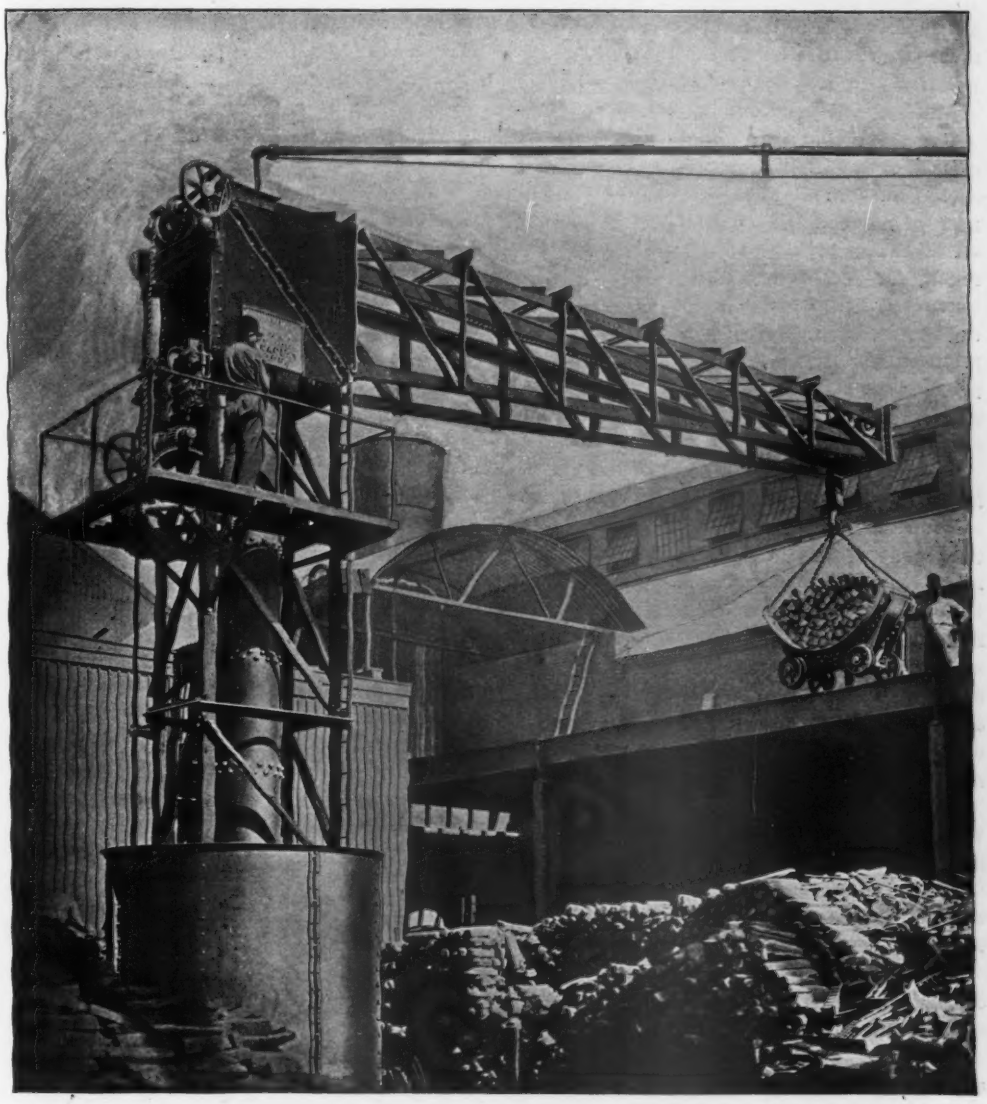

30-TON STEAM JIB-CRANE.

Height of post, 26 feet; effective radius of hook, 23 feet. All movements by power. Driven by independent 8x8 feet engines, bolted to frame carrying machinery, receiving steam through upper pintle and discharging exhaust through step in foundation plate.

ioned, wooden prototype, we find that the jib crane, far from becoming obsolete, has been modernized and improved in quite as marked a manner as in the case of the traveling crane.

There are numerous subdivisions of both classes of cranes, such as pillar, column, derrick and locomotive cranes. Some have rotary motion around a mast or column; some have rectilinear motion, in which the load is moved in one or more directions in straight lines; they are, moreover, designated as hand, power, steam, pneumatic, hydraulic, and electric, according to the particular motive power.

There are certain fundamental principles



5-TON STEAM PILLAR JIB-CRANE.

Carried upon riveted steel pillar, bolted to foundation, driven by independent steam engine, and receiving steam from stationary boiler through top pintle bearing. Post of crane protected by cylindrical guard. Operating platform elevated. Maximum heigt of hook, 25 feet. Effective radius of the hook, 30 feet.

which are applicable to all cranes. The first and most important consideration in a machine, designed to transport enormously heavy materials over the heads of workmen, is the factor of safety.

The second important consideration is that of speed, in which the ability to reach the load to be moved in the shortest possible time (whereby the preliminary operations of getting ready to lift are materially hastened) must be combined with a steady motion when hoisting the load—free from jar—and susceptible of the most delicate adjustment.

The third consideration—largely a consequence of the second—is that of economy of operation. This implies, in addition to quickness of movement, the judicious location of all working parts within easy sight and reach, for facilitating oiling, tightening of nuts, etc., by the attendant when not operating the levers; ease with which parts may be removed for repairs, together with ample proportions of each piece in its proper relation to the whole, all tending to minimise the cost of maintenance.

The functions of the jib and of the traveling crane, while sometimes overlapping, are more often quite distinct. It may be said, in a general way, that in foundries where heavy castings are made—necessitating the handling of long flasks, large cores, and immense ladles of molten metal, the overhead traveling crane, occupying no floor space, and performing the work of a number of jib cranes more expeditiously, presents economic advantages of such importance that it has now come into almost universal use.

In establishments where miscellaneous work, of comparatively light weight, requiring frequent service by molders, for short intervals of time, of a quick hoisting apparatus of moderate capacity, the modern jib crane, however, presents superior advantages; in not a few foundries a combination of jib and traveling crane is found very economical.

There are local conditions which also exert influence in determining the relative value of jib or traveling cranes. A long, narrow foundry, where molds are situated at a distance from the cupolas, is better adapted to the use of traveling cranes than a foundry of different shape, where the molders' floors are, perhaps, laid out in circles and each molder is more conveniently served by an independent jib crane, with its post in the center of his floor.

I may cite—as an evidence of the comparative economy resulting from such appropriate arrangements—an instance coming under my own observation, where, in one car-wheel foundry, twenty wheels, 33 inches in diameter, make the usual day's work of a molder, while ten molds in another similar establishment, without equal modern facilities, constitute the usual day's work, the only important difference between the two being in the superior facilities for handling flasks and wheels in the first named case.*

The old-fashioned jib crane was an exceedingly clumsy construction of timbers, bolted together, braced with wrought iron rods and capped with iron castings. This composite structure was not only cumbersome in appearance and slow of motion, but it was subject to deterioration through shrinkage and decay, caused by heat, cold, and dampness.

Such structures are indeed obsolete to-day; but they have been replaced by jib cranes having a light framework of wrought iron, scientifically constructed, advantage having been taken of the great improvements and economies which have occurred in the manufacture of structural iron in recent years.

The tendency to follow in beaten tracks was evident even after wrought iron was substituted for wooden frames, but it was soon found that the rapid rotation as well as quick hoisting, required in modern cranes, demanded an entirely different structure, having much greater torsional stiffness.

A basket framework of lattice girders, having both lightness and strength, was then substituted for "I" beams or channel bars, and, in the improved type, the trolley or carriage travels within the frame work of the jib, which is additionally strengthened by cross bracing across the top.

*A recent editorial in London Engineering (March 6th) entitled "Panaceas for Labour Strikes," instances the case of two ship yards side by side in one of which steam derricks are used for plating, and the price paid is 8 shillings per plate, whereas in the other yards the plates have to be lifted by manual labour, and the employer has to pay for the same size of plate 8s 6d. It is surprising that any firm should be without steam derricks, and there is little wonder that the men getting 8s. 6d. a plate earn less wage than those paid 8s.

The post is latticed and cross braced on all four sides in the same manner, and wide plates are used to strongly unite the parts of the frame both at the top and bottom. The absence of a diagonal strut, such as is necessary in the old-fashioned wooden jib cranes, permits the work to be moved much nearer to the axis of rotation than was formerly possible.

Jib cranes may be supported at the top, by bearings attached to the roof girders, by struts from the walls, or they may be made to embrace columns which support the floor of the building, or the column may be a pil-

10-TON ELECTRIC JIB-CRANE.

With two hoisting speeds. Effective radius of jib, 30 feet. Operated by single constant speed motor. Arranged to lower by power or brake, as may be required.

lar secured to a sufficient foundation requiring no support from roof or wall. In some forms of swing cranes the jib may be raised or lowered to increase or diminish the diameter of the circle.

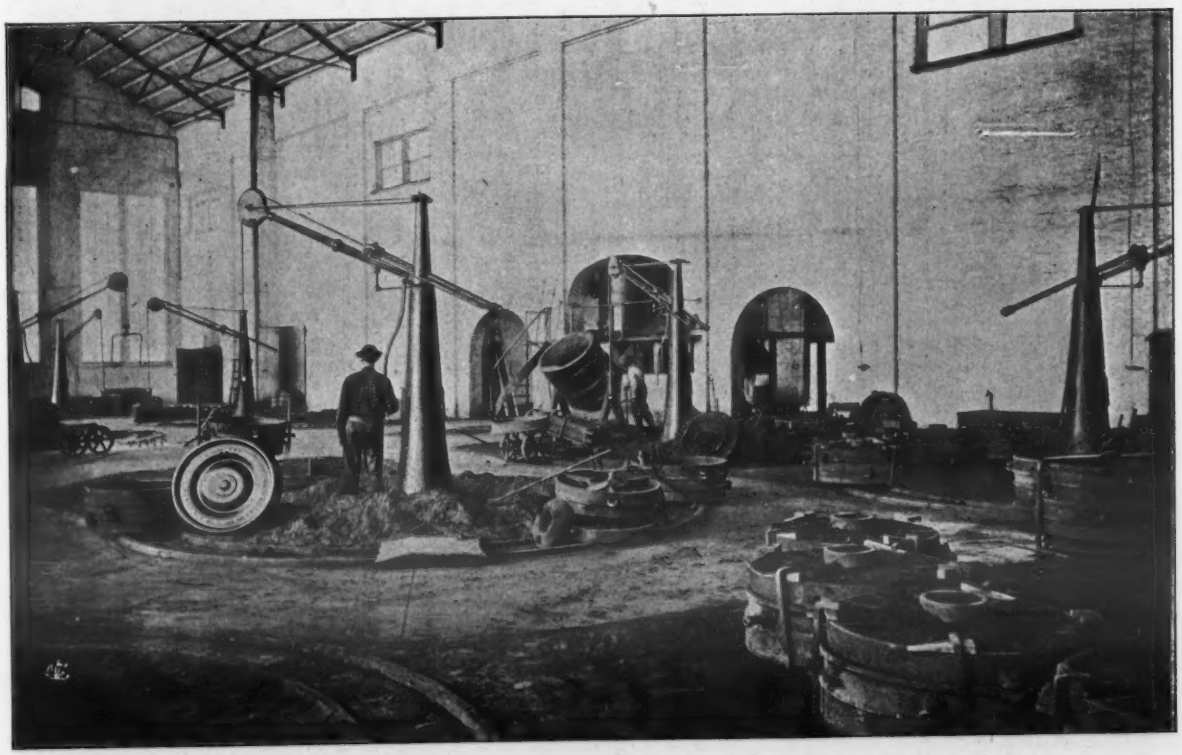
turning over flasks, in molding; others are mounted on trucks and are especially designed for work in car wheel foundries. Indeed, the variety of special uses for small cranes is almost without limit, and in all,

1-TON HYDRAULIC PILLAR CRANE.

In addition to the forms of cranes here described, there are a large variety of smaller hoists, operated by hand, as well as by pneumatic, steam, hydraulic and electric powers. Some of these are specially designed as attachments to machine tools, for lifting heavy work; others are used for raising and

great improvements have been made both in quickness of movement and in lightness of construction.

Foundrymen in America have, as a rule, been content with the simplest and cheapest forms of hoisting appliances which the character of their work would permit, but



VIEW IN CAR WHEEL FOUNDRY OF PENNSYLVANIA RAILROAD, SHOWING HYDRAULIC MOULDING CRANES AND LADLE-TILTING DEVICE.

recently much more attention has been paid to improvement in the crane facilities of foundries and machine shops. This has been due, in part, to competition, which has compelled manufacturers to consider economy in every detail of their work and methods, and in part to the fact that crane builders have developed and improved foundry cranes, so that it is possible now to procure much more perfect machines of this character than could be obtained a few years ago. The electric motor has played a very important part in this development, since it affords a most convenient method of conveying power to a moving machine, like a crane.

The first marked improvements in swing cranes were in the direction of applying power—either steam or hydraulic—and, for some purposes, noticeably for Bessemer steel making such cranes were carried to a high degree of convenience and efficiency. The swing crane, though well adapted to work where the weights to be lifted are confined to the area covered by the crane—as in a pipe foundry or Bessemer steel pit—is not so convenient when it becomes necessary to handle product of varying size and shape, and to transfer such pieces rapidly from one end of a foundry, or shop, to another.

The time lost in adjusting chains and the inconvenience of reserving floor space for temporary resting places for such objects in transitu constitute objections to the swing crane under which many manufacturers are unwilling to continue to labor when it is no longer necessary. The traveling crane, covering, as it does, all the available space beneath it, if properly designated, does the work of many swing cranes.

Passing on to the study of traveling cranes we find that while overhead travelers have been used for many years, they were formerly crude devices, originally having wooden bridges requiring much splicing for long spans, besides trussing and bolting to add greater strength. They were usually operated by ropes or by independent engines.

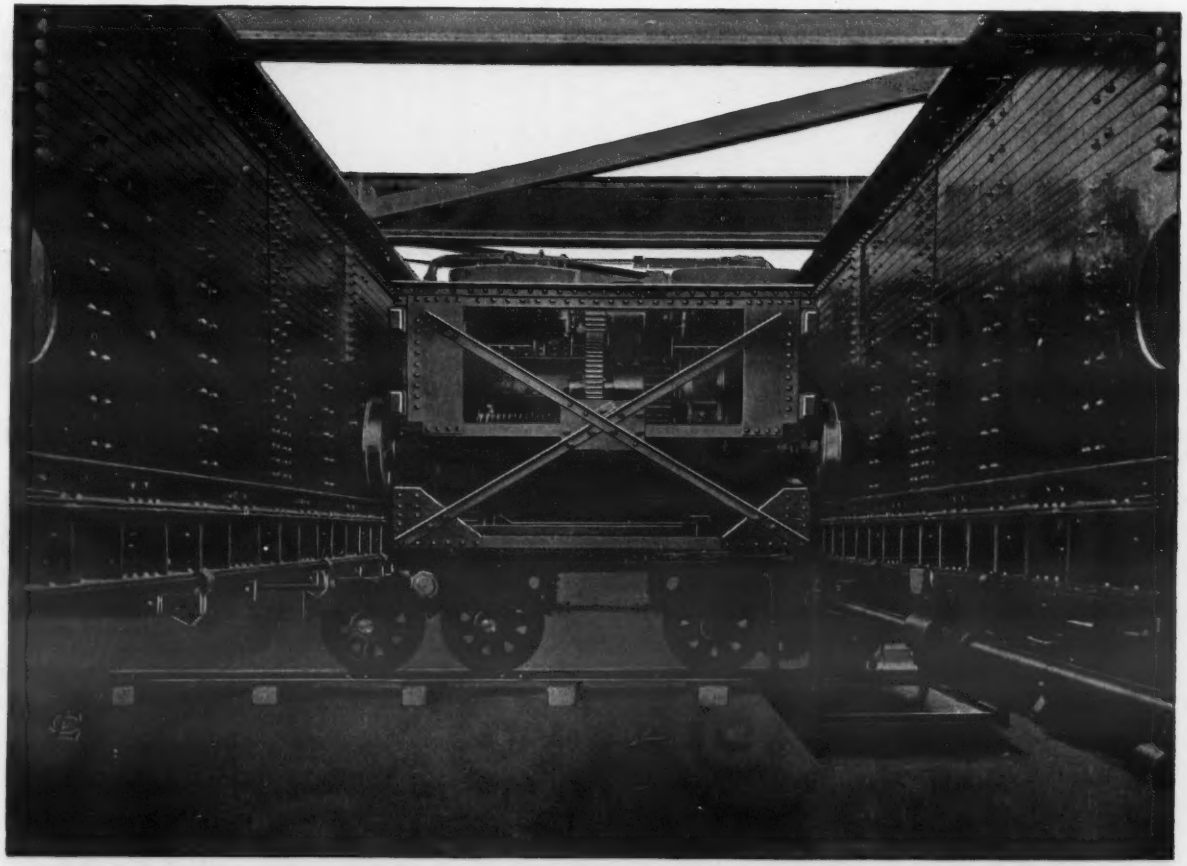
These old traveling cranes were necessarily very slow in movement, and the improvements which have rapidly followed the substitution of iron girders for wooden trusses, mechanical—or,still more recently, electrical—power for hand movement, with addition of quick running gearing, increased lifting capacity, friction clutches, and other safety devices, etc., etc., have combined to produce practically a new machine and an invaluable aid to the founder, or other manufacturer.

Various devices have, at times, been applied to conveying power to a traveling crane. Ropes, square shafts, grooved shafts, belts, compressed air, steam and hydraulic power have all been tried and are still, to some extent, used, but it was found that to operate heavy cranes at reasonably high speeds, the rope drive was entirely inadequate, and to transfer the necessary power by square shaft requires either a very large shaft or a very high rate of speed, and consequent large waste of power by friction. Then, again, the shaft revolves continuously, while the crane is operated at irregular intervals, often with long periods of rest, during which the shaft is absorbing an abnormally large share of power in the foundry or machine shop.

The electric motor has solved many of these problems, and it is now practicable to make traveling cranes which operate successfully and economically at speeds which would have been regarded as impossible by foundrymen ten years ago. Electricity is applied to cranes in various ways; thus, a motor may be used for each of the motions that it is desired to produce, the speed and duration of each movement being governed by controlling and stopping the speed of the motor. These are called "three motor" or "all electric" cranes, while others are operated by machinery situated at a fixed point on the bridge, and driven by a constant speed motor, the various movements being controlled and regulated by a system of clutches and mechanical transmission devices.

In the "all electric" type, the machinery, the motor, and the load are started from a condition of rest. In the latter case the motor and that portion of the machinery which is running while the crane is in service, act as a fly-wheel to assist in starting the load, with the result that there is less demand for current in cranes of this type at the moment of starting than in the former.

Before proceeding to describe in detail the various parts of traveling cranes, it may be well to pause for a moment to consider some of the essential qualifications of the perfect



150-Ton Electric Travelling Crane.

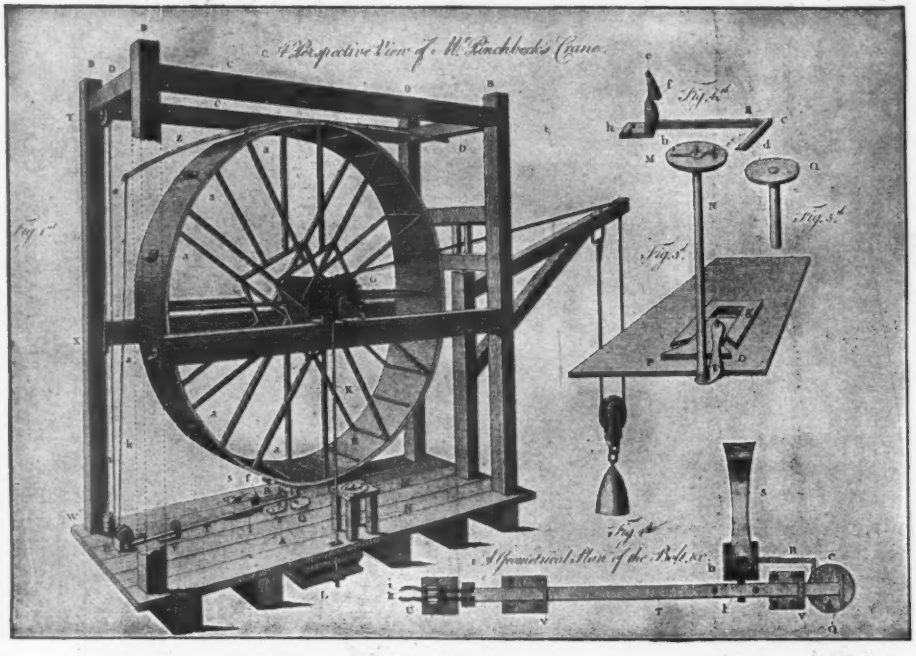
This crane is operated with independent motors for each movement. The plate represents the interior of the bridge, and shows one of the trolleys in position. Capacity of trolleys, 75 tons each.

foundry crane. These considerations will apply equally well to all cranes.

I have already adverted to the necessity of absolute safety under all conceivable conditions. This implies that the load can never run down; it must always be pushed down by the hand of the attendant, so that if, in a moment of danger or excitement, he should suddenly desert his post, the load will remain automatically held until released by the operator.

The perfect crane must, moreover, move easily, stop and start gently, and must hoist vertically, no matter how many links of chain are paid out from the drum, so that the delicate operations of the foundry, such as raising, turning over and closing long flasks, etc., may be accomplished with absolute certainty. Every founder realizes the importance of these conditions, not only in the specific operations named, but in others —such as in the setting of large cores, drawing of patterns, etc.—they are even more imperative.

It would perhaps appear, at first sight, impracticable for one traveling crane to attend to the wants of a number of molders in handling molds and cores, and more particularly at "pouring-off hour," when ladles of molten iron must be handled without loss of time. Experience has shown that, under average conditions, one good modern traveling crane meets these severe requirements; it is certainly a tribute to its inherent capabilities that this should be the fact. Something, however, should be credited to the foundry foreman in this respect, for a clever man can modify the routine methods to suit the new conditions, so that these difficulties soon vanish and are forgotten, like many other ancient customs.



The elevated railway traveling crane, as now constructed, consists of four essential parts:

(1.) The elevated tracks.

(2.) The traveling bridge.

(3.) The trolley car, traversing the bridge and carying the hoisting mechanism.

(4) The motor or driving mechanism.

The elevated tracks are supported by columns, or, in buildings specially constructed, they are sometimes built in and supported by the walls. These tracks run parallel and close to the walls from one end of the build-

ing to the other. The bridge is constructed of two parallel girders, extending from rail to rail, spanning in mid-air the breath of the building. Four double-flanged wheels, usually steel-tired, with steel axles running in bearings, are bolted to projections on the girders.

The trolley car, also provided with double-flanged wheels, runs upon steel rails laid within or upon the bridge and bolted securely thereto. This car is provided with a grooved drum and double chain, wound thereon, carrying a forged swivel-hook, mounted securely in a hoisting block, the block being furnished with sheaves through which the chain runs. In some large cranes the hook turns on ball bearings (more than 600 balls were used in one instance), and it is found that the friction is so reduced by these balls that one man can easily revolve a load of 50 tons, suspended from the hook. By properly arranging the grooves on the drum, and winding the double chain always toward the center, a perfectly vertical lift of the load is assured.

I have carefully endeavored in the foregoing descriptions of jib and traveling cranes to state only the broad general principles underlying this species of mechanism, avoiding allusion to any special features of different makers or of different designs of any one manufacturer, desiring to treat the subject in as comprehensive a manner as space will enable me to do.

I was fortunate enough to find among the rare and valuable old books which are hidden away in the Franklin Institute, a beautifully illustrated work, printed in London in 1782, entitled "Machines of the Society of Arts."

Through the courtesy of the secretary I am able to show the illustration of this English crane; I also have obtained a brief and imperfect description of it, and a copy of the award, which is as follows:

"This new invented crane of Mr. Pinchbeck was referred to the committee of mechanics, who was of opinion that this method of preventing fatal accidents (which frequently happen in common walking cranes) is entirely new, ingenious, and very effectual for the purposes intended.

"A trial of the crane was made several times at Dices' Key, with an hogshead of potash, 6,000 pounds weight, and it appeared to the committee that the invention will fully answer under all circumstances, and may be constructed at an easy expense; it was therefore recommended to the society, to give Mr. Pinchbeck the gold medal of the society for his ingeniously constructed and useful invention, to which the society agreed on June 3, 1767."

In the illustration, E is a great walking wheel, in which men walk (evidently for hoisting the load). It is 6 feet 4 inches in diameter, and 1 foot 4 inches wide.

M is a dial-plate or regulator. The segment of this plate is divided into three equal parts, 1, 2 and 3, with a directing hand, by which the motion of the walking wheel is regulated in the following manner: When pointed to No. 1, the aperture g, for discharging the wind out of the bellows, is dilated to its greatest extent to give vent to the wind; when set to No. 3, the aperture is contracted to its smallest dimensions, by which means the upper bellows retains the blast of wind.

Q is a lifting trundle, passing through the floor, extending so far below it as to be lifted up by the upper board of the receiving bellows when the walking wheel accidentally revolves with too great velocity. The trundle, latch, sliding bolt, and all other movements are at all times in a state of rest until the walking wheel is by some accident violently agitated, and when it so happens the expansion of the bellows will be so far extended as to lift up the trundle, latch, etc."

---

### New Foundry Enterprises.

The Stowell Mfg. & Foundry Co. is a new concern at Milwaukee, Wis.

The Kutztown Foundry & Machine Co. is a new concern at Kutztown, Pa.

Chas. Leonhard has his new foundry at New Ulm, Minn., in operation.

The Robinson Foundry & Machine Co. has been organized at Birmingham, Ala.

The Fulton Truck & Foundry Co., at Mansfield, O., will enlarge their foundry.

The New Departure Bell Co. are erecting a brick brass foundry, 112x60 feet, at Bristol, Conn.

At Knoxville, Tenn., the Fair & Day Foundry Co. will double the capacity of its plant with a new building 60x60 feet.

A TECHNICAL JOURNAL DEVOTED TO FOUNDRY INTERESTS.

# THE FOUNDRY

*Published Monthly by*

"The Foundry Publishing Co."

DETROIT, MICH.

**JOHN A. PENTON,**

EDITOR AND PROPRIETOR.

DETROIT, AUG., 1896.

Entered at the Post Office at Detroit, Mich., as second-class matter.

SUBSCRIPTION—One Dollar per year in advance in all parts of the United States and Canada; one dollar and fifty cents per year to all parts of the Universal Postal Union. May be sent by express, draft, money order, registered letter or U. S. postage stamps. Single copies, 15c.

CLUB RATES—Eight or more subscriptions sent at one time, 75 cents per year each. Cash to accompany order.

*Advertising rates furnished upon application*

SUBSCRIBERS can have address changed as often as desired

IF YOU FAIL to receive your paper promptly, please notify us.

THE FOUNDRY is issued promptly on the 20th. of each month, and will spare no endeavor to furnish valuable news and information to those interested professionally or incidentally in molding, melting, mixing of metals, foundry management, etc. Persons connected with any of these lines of industry will confer a favor upon the Editor of this Journal by sending him news from their section of the country pertaining to the foundry interests, particularly individual theories and experiences of practical value.

**The Detroit News Company,**

**Publishers' Agents, Detroit, Mich.**

DEALERS SUPPLIED BY

The Albany News Company, Albany, N. Y.
The Baltimore News Company, Baltimore, Md.
The Brooklyn News Company, N. Y.
The Buffalo News Company, Buffalo, N. Y.
The Central News Company, Philadelphia, Pa.
The Cincinnati News Company, Cincinnati, Ohoi.
The Cleveland News Company, Cleveland, Ohio.
The Colorado News Company, Denver Colorado.
The Detroit News Company, Detroit, Mich.
The Minnesota News Company, St. Paul, Minn.
The Montreal News Company, Montreal, Canada.
The National News Company, New York, N. Y.
The Newark News Company, Newark, N. J.
The New Orleans News Company, New Orleans, La.
The New England News Company, Boston, Mass.
The New York News Company, New York, N. Y.
The Northern News Company, Troy, N. Y.
The Omaha News Company, Omaha, Neb.
The Pittsburg News Company, Pittsburg, Pa.
The Rhode Island News Company, Providence, R. I.
The San Francisco News Company, San Francisco, Cal.
The South West News Company, Kansas City, Mo.
The St. Louis News Company, St. Louis, Mo.
The Toronto News Company, Toronto, Ontario, Canada.
The Washigton News Company, Washington, D. C.
The Western News Company, Chicago, Ill.
The Williamsburg News Company, Brooklyn, E. D., N. Y.
The Wisconsin News Company, Milwaukee, Wis.

## Trade Outlook.

There is just as little business doing as possible, and that is after all a good deal. The hourly, daily, weekly and monthly requirements of seventy millions of people make it absolutely necessary that a tremendous amount of business shall be transacted, and it is being done, but it is of the "have to" compulsory sort and lacks the enthusiasm, energy and hopefulness apparent in ordinary times.

Now while business is being done in such a conservative way, with margins as close as they can be possibly made all along the line, there is yet much promise that the removal of the cause for this stagnation next November will see the beginning of a prosperous business era that may make up for the past few years.

In the foundry business those most affected are what is known as machinery or jobbing foundries, they being always the first to feel any fluctuation. Specialty shops continue to be fairly busy, and as the list covers now such an extensive range, such as malleable, stove, bench, pipe, hardware, etc., it can be easily seen that they form a very considerable element.

The decrease in the price of pig iron has slackened up some, and while stocks have not decreased any, the number of furnaces in blast has fallen off, so that a decrease in stocks is certain.

Any sudden restoration of confidence could not fail to greatly improve the condition of the iron-making business and it would probably be one of the first things affected.

Taken altogether, while the condition of trade presents no rose-colored features, yet what is being done is being transacted in a very safe manner that all possibility of any over production is impossible and will enable our foundrymen to take prompt advantage of any favorable turn in the tide in their favor.

## Scrap Heap.

If there is one grain of consolation to be extracted from the incessant turmoil the politicians of this country keep us in through their advocacy of radical measures, it is the fact that it is compelling the people of the United States to thoroughly study these abstruse problems.

As a natural result, Americans are becoming the best informed people on earth on all vital questions affecting trade and commerce, and nothing is surer than that this superior degree of intelligence is going to make itself felt sooner or later.

* * *

Just now we may feel like the little boy who said concerning the alphabet he was studying that "he did not think it was worth while going through so much to learn so little," but in the end we will be well repaid.

* * *

These politicians by their grand controversies are furnishing the people with a means of education it would be impossible to receive in any other way. The best informed men, the best speakers, the most learned statisticians and the most brilliant authors all combine to present, free of charge, all phases of these questions to every voter in the nation. Coupled with this we have the fact that tons of literature are freely circulated and the best thoughts from men on all sides of the question are printed in the columns of our daily papers, and it looks as if there no longer existed any excuse for lack of information.

* * *

Then, by way of an object lesson, we find that these agitations produce such an unstable feeling that business of all kinds receives a severe check, and as a result large factories, mills and manufacturing establishments of every description are shut down and thousands of employes are given leisure to do some hard thinking while experiencing the distress occasioned through the suspension of operations while the people are going to school.

* * *

One of the results of this is going to be that when any set of men advocate any new theory of government it will have to possess much merit to receive any serious consideration. Another one will be the selection of superior men to represent us in our National Legislature and the discrediting of those who endeavor to climb into office by appealing to the prejudices of their constituents.

* * *

An increased degree of intelligence and information on public questions will soon enable the voters to select the wheat from the chaff and prevent the introduction of all this pyrotechnical bombast so commonly indulged in and which is so prevalent on both sides of the question now being agitated before the American people.

---

### Krank's Korner.

Every now and then somebody takes the bandage off that old sore—the molders' incompetency—and applies a coating of his favorite liniment for this disease. While thus engaged there are few who admit that each year presents an increased demand for greater skill on the part of the molder. The consumers of castings find from time to time that there is something else which the foundry can correct, and are not slow in making their demands heard or enforcing them either.

* * *

Interchangeability encroaches upon new lines of manufacture so stealthily but so persistently, that complaints about castings not being of uniform dimensions are heard without a fair warning. Some parts of machinery, on which a few years ago a large amount of machine work was performed, are to-day assembled as they come from the foundry, or if not totally so the amount of chipping and fitting has been greatly reduced. Nice, smooth castings are not the only thing sought after in these days, where manufacturers seek to get along with as little machine work as possible. "Castings true to patterns" one foundry advertises, and this, within certain limits, is the keynote to good castings at present.

* * *

This state of affairs is felt to a greater extent in green sand molding, where complicated designs are indeed taxing the capacity of the molder, and failures resulting are taken as an indication of his incompetency. Castings which formerly required a large number of cores are to-day being made in green sand altogether. Of course, this has necessitated the making of patterns on different lines than formerly, and of the extra planning all around no one can estimate who has not been in continued touch with the foundry. This tendency to make green sand molding go as far as possible has naturally for its chief object accuracy, though the added accuracy which green sand gives over dry sand cores has also influenced designers to take this step.

Continued practice may be said to be the great requirement in complicated green sand molding. To expect that men can be picked up offhand and prove effective, is a fallacy for which many foundrymen are paying a penalty. The everlasting changing of crews in which some founders are indulging is not conducive to creating first-class workmen or producing the best of castings. The limit to a green sand molding ceases only with the molder's skill, a skill that must be several points higher, to come up with the demand of to-day, than it ever was before.

* * *

The control of the combinations that make a high grade casting possible does not rest with the molder entirely, however. The inferiority of the outfit with which he is often supplied precludes the possibility of even making a fair start towards a successful finish.

### Trolley Systems.

Mr. Editor—I was very much interested in the article under the above heading by Mr. H. M. Ramp in the April number of THE FOUNDRY.

In speaking of the various forms of trolley tracks, he says: "It is questionable if a safe and serviceable switch can be made with a single rail."

The Adams Company, of Dubuque, Ia., have in their foundry a single rail trolley system that for the purpose designed and used has proved satisfactory, and I believe the switch is as safe as any double track system can be. A description may be of interest to your readers.

The principal work done in this foundry is light castings, but the shop is of considerable length, and some of the floors are necessarily a considerable distance from the cupola. To deliver the iron to these remote

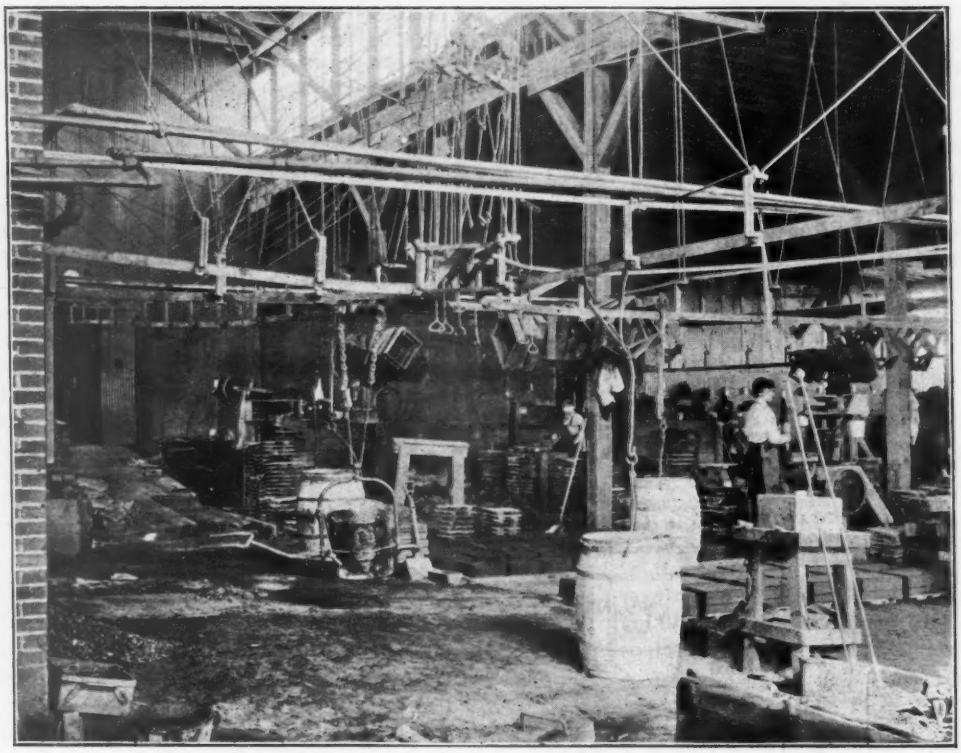


FIG. 1—SHOWING OVER-HEAD TRACK.

floors was the original design of this trolley system, but it quickly developed its usefulness also as a means of conveying the castings from the foundry to the mill room.

This track is light and was tested with a weight of 1,200 pounds. The greatest weight it carries in service does not exceed 800 pounds, but I see no reason why a single track could not be made on the same principle, heavy enough to carry any desired weight.

The question of safe and serviceable switches were pretty well tested with this system, as the switches are quite numerous and complicated.

Two gangways which run lengthwise of the building are connected by a cross gangway from in front of the two cupolas just back of the brick wall shown at the left in

To convey the ladle from either of these cupolas, to either of the gangway tracks, required a four-way switch and a cross, all of which had to be located under the highest part of the roof and required quite a network of supporting rods, which look more complicated in the photograph than they really are.

Three-way and two-way switches occur at several other places throughout the foundry and mill room.

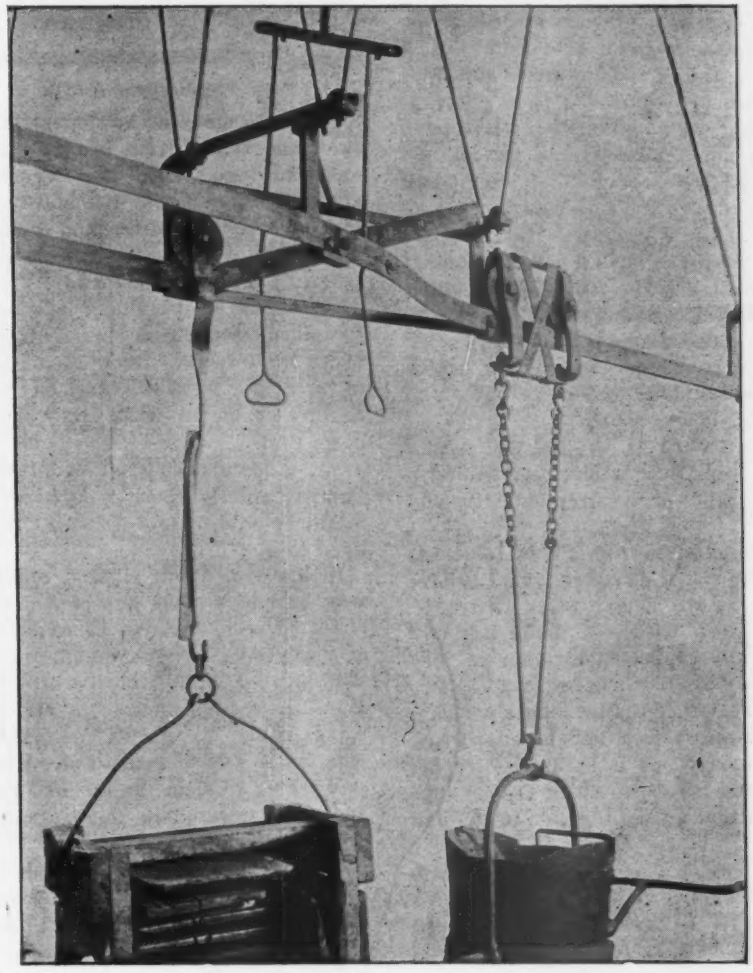


FIG. 2—SHOWING VIEW OF SWITCH.

The track is at an even height of 7½ feet above the floor, raising about three feet as it enters the mill room door as seen.

The hangers are of cast iron with a lug at the bottom, on which the flat ½x2½ track rests and is bolted.

At the rail splices and switches; the hangers are made wide enough to receive two bolts which pass through the end of each piece of track.

The switches raise up and down in positions. The two-way switches are connected at equal distances from the center of a pivoted lever above, and the three and four-way switches are connected to a series of levers having weighted arms so arranged that all but one of the switches are held up, and when the desired switch is pulled down in position, it lifts the one that is in position up out of the way.

Should a workman push a car upon one of these open switches, the car would be either stopped or would run up the incline until the weight was sufficient to lift the other switch out and allow the one on which the car was running to drop in place and the car could then proceed.

When the switch is in position, a slot in the end drops over a bolt and behind a plate, which holds it securely sidewise and endwise.

It is impossible to run a car off these switches from either direction, and I believe it is as safe as any double track switch.

The car used with the ladle has two wheels swivelly connected together so they readily pass around curves. The two wheels run smoother than a single wheel.

A light wrought iron hanger supporting a single flanged wheel is used for carrying the barrels and crates in which the castings are gathered that are to be taken to the mill room.

It will be noticed that the barrels are connected to the trolley hanger by means of a lever, which is designed to lift a loaded barrel off the floor, or let it down when at its destination in the mill room.

It sometimes occurs that a workman with an "empty" meets another with a loaded barrel on a part of the track some distance from a switch, in which case he unhooks his trolley and lets the load pass.

This could not well be done with a double track system, as the cars could not be easily removed.

At figure 2 is shown a view of the switch and two trolleys. It will be seen that there are two handles, marked A and B, operating respectively switches C and D. By pulling down on A it brings the switch C into position and raised switch up out of the way through the operation of cross beam at E. By this automatic arrangement it is absolutely impossible for trolley to run off of the track.

F. O. FARWELL,
Supt. The Adams Co.

## Matthew Addy.

Death, at once the most uncertain and yet the most certain event in man's career, that steps in here, there and everywhere to snatch from our busy life and busier world those whose allotted term on earth and with loved ones would seem to have ceased, has taken from us Matthew Addy.

Hundreds of prominent and well-known foundrymen and iron men scattered among every State in the Union must have paused in their busy work to reflect on the ultimate destiny of us all when they learned the news first.

Mr. Addy's taking off could not fail to impress greatly those who knew him. It might be said of him so truly "that he had lived to die."

In his own quiet, modest, unostentatious way he had become one of America's merchant princes, and yet at no time was he ever anything but the genial, approachable, kind-hearted, high-minded Christian gentleman, always considerate of others and always ready to aid a deserving cause, whether it was to assist a struggling young man trying to stem the tortuous currents of business or contribute to some public enterprise or charitable purpose.

He was singularly retiring in all things that might be productive of any publicity of himself, and shrank from even having any reference made in print to any of the successful business ventures in which he was interested.

No greater insight into his private character could be furnished than the following extract from a letter recently written by one who knew him most intimately and was well qualified to describe his character:

"Mr. Addy was one of the most just and generous of men. He had the respect of all

who came in contact with him. In business he belonged to the old-fashioned school that hold honor, integrity, absolute straightforwardness and unflinching adherence to right and truth far more than all else besides. His main pride was to be counted as a merchant who had never broken his word, who had never repudiated an obligation and who had never undertaken to do what he had not fulfilled. He was dignified and reserved, but yet particularly approachable. He never proffered advice, but when it was asked was most ready to give it. His advice, coming from so many years' experience and success, was invaluable. His death came in the very prime of life, for he was only 61 years old, and should have been spared for many more years of usefulness. He naturally had a frail constitution, and while he took the best of care of himself, yet for many years there was no harder worker in Cincinnati. The gifts he made during his lifetime will aggregate many scores of thousands of dollars. He believed in giving while he lived, wishing to see the results of his benevolence. He thought this the most intelligent and satisfactory way of giving. He frequently said that success brought to him no greater pleasure and no greater privilege than the opportunity of giving."

Another gentleman who had had business relations with Mr. Addy aggregating many hundreds of thousands of dollars, in speaking of his death, said: "In all my business experience I have never known a more honorable man, and do not believe I ever shall. He seemed always to be fair, anxious to accommodate, always lived up to every agreement he ever made, and many times he could have easily, to his own great profit, taken an advantage that many men would have considered justifiable."

Such testimony from those who knew him best proves that no monument that could be erected by mortal hands can compare with the good name he left behind, as an enduring legacy to his family and friends.

Mr. Addy was born in Montreal, Canada, in 1835, and went to Cincinnati when a very young man and found employment as a bookkeeper, afterwards going into the commission business for himself, the main staple being cotton; afterwards he added pig iron, and as changes in the laws of trade lessened the volume of the cotton product marketed in Cincinnati and increased the iron product, he relinquished the former and gave all his attention to the latter.

He was an important factor in making Cincinnati the great market for Southern iron, and in popularizing it in the Northern States.

As a result of careful management a very large business was created and Mr. Addy became widely known as a very prosperous man.

As founder and president of the Addyston Pipe and Steel Works, he took an active interest in that concern, and it became one of the largest plants of its kind in America.

The foundry trade loses one of its most conspicuous figures by his sudden taking off, which occurred at Falmouth Heights, Mass., August 2, of cancer of the stomach, and THE FOUNDRY feels that it has lost a friend who took much interest in its prosperity and had always a kind word for it.

### Eyesight of Ironworkers.

In the mining and foundry district of Bochum, Prussia, Dr. Nieden reports having treated during the years 1885-94, 5,443 patients engaged in such occupations, of whom more than 68 per cent were cases of injury to the eye in their calling—iron and foundry workers showing a large predominance in this respect over miners. Of 3,723 iron and foundry workers treated for eye injuries, 2,805 were for the left eye and only 1,638 for the right, or a relative proportion of 56 to 44; and, as a similar proportion held good in each separate year, the conclusion arrived at is that in such work the danger to the left eye is really greater than that to the right. Even more marked, in fact, was the proportion in respect to the severe cases, the left eye being quite lost in 17 cases, the right only in seven. It is urged, therefore, that in ironworkers the loss of the right eye should be calculated as the more serious, inasmuch as the individual then runs a greater risk of injuring the remaining eye than when he has lost the left.

---

I enclose one dollar to renew my subscription for THE FOUNDRY and consider it the best possible investment any Foundry man can make of the almighty dollar.

GEO W. SMITH,
Oshkosh, Wis.

# CAST IRON NOTES.

**Devoted to Inquiries from Practical Foundrymen on the subject of Melting and using Cast Iron. Address all Inquiries to W. J. KEEP, care of The Foundry.**

## How to Gain a Knowledge of the Nature of Cast Iron.

The following is a continuation of a series of questions commenced in the July issue of THE FOUNDRY.

QUESTION: DEFLECTION — Where do you measure the deflection on the diagram?

ANSWER: At the point of fracture, but if you wish to compare the deflection and set of different test bars, you must compare them at a definite point in each as at 300 or 400 pounds.

QUESTION: ECONOMY—We now come to the most important point; changing the mixture to vary the silicon is, we understand you claim, all that is needed. Now while we do not make a point of always buying on any guaranteed analysis, we must have some idea of the silicon percentage of the iron offered us, in order to know whether it will suit our purpose. Which are the best so-called silicon irons and which are the cheapest? How is it possible to add to the mixture anything near the right percentage of silicon unless we know how much silicon the pig contains that one desires to employ as a softener? Of course we are aware we could experiment with mixtures till the right shrinkage, strength and chill were obtained. That may or may not be right when you have the pigs in the yard, but we should like to know what your present opinion is, as to the right irons to buy (both silicon and otherwise) together with any data concerning the percentage of silicon in the silicon irons, you may care to give, especially as you state "that 2 per cent silicon in one kind of pig will be more effectual than 2.50 per cent in another kind." Silicon irons, we understand, have a light gray fracture and a silvery shine. Is about 1-4 of 1 per cent the right proportion to allow for loss of silicon in melting? We are using now five brands of pig iron and scrap. We use these alternately, that is only three (or at most four) kinds of iron per day. In changing we do not of course change more than one kind of an iron at a time. Any suggestions you are good enough to make on the point of economy we shall greatly esteem.

ANSWER: The only practical method of regulating the quality of castings is to vary the silicon, at the same time remembering that various conditions vary the efficiency of silicon and that strength is not necessarily dependent on silicon, and more than all remembering that all of the approximate rules that I have proposed only apply to the individual mixture that you are using. If you were to make a complete change of irons the next day, though an analysis might show exactly the same silicon, yet for reasons already given, the physical quality might not be anything like the same. For this reason your method of alternating each day is absolutely wrong. The more irons that you have in a mixture at one time the better, because if any one car of iron should vary it would affect the mixture less because less of each kind is used. Proportion the mixture according as you have made your purchases, or according to the iron on hand, using each iron each day. Measure the shrinkage and compare it with the shrinkage that you consider your standard. Apply the rule that more silicon reduces shrinkage. Suppose you do not bring the shrinkage down the second day, or if you bring it down too low, no harm is done, as there are no very close margins in gray iron castings. The third day you come still nearer. Where shall you get the silicon? It is very convenient to have a definite percentage of silicon guaranteed, unless you are obliged to pay more for it. You should always ask how much silicon each iron is expected to contain. The name of the grade of the iron gives you an idea. In such a foundry as yours the scrap used is an important factor, and you can in no way tell the percentage of silicon it contains. This must be an unknown quantity, and the influence that the silicon in the pig iron can exert is also unknown. The guaranteed analysis is very indefinite, as they only guarantee to within about one per cent, and as you say about one-quarter of one per cent is lost in melting, and the pressure of blast, the state of the atmosphere or the quality of the fuel will very greatly influence the physical quality of castings. With all of these uncertainties and no close relation anyway between the chemical and physical quality,

it is hardly best to spend time in figuring percentages, but measure the physical quality at once, and then increase or decrease silicon as needed. For machinery irons silicon iron (silvery) is not a necessity, as enough silicon can be obtained in ordinary grades, but No. 1 or 2 soft southern pig iron will contain about 3.50 per cent. Southern silvery iron will contain over 4.00 per cent. The silicon in these irons will be as efficient as in any other, and they are cheap irons. The silvery irons of Ohio or of Ashland, Ky., contain from 6.00 to 8.00 per cent. It is always best to have at least a carload of some of these irons in the yard, to be able to make a quick change when necessary, but the safe rule for mixing iron is never to make any radical change, and to change only one iron at a time, for this is the only way to determine the effect of a change.

QUESTION: OUR 1"X1"X12" TEST BAR MACHINE—Seldom has our average breaking strain on this machine exceeded 2,600 to 2,900 pounds, the same iron giving on your machine averages from 400 to 450 pounds. If we use the ordinary formula with the latter, the former should have been 3,200 to 3,600. Why is this result so much beyond what the inch machine registers for the same iron? We would be exceedingly obliged if you would kindly give us enough data as would enable us to compare these two machines.

ANSWER: The formula is not correct, and there is no mathematical formula by which you can reduce the strength of one size of test bar to that of another. The only correct approximation is to use the graphic chart which I have constructed, and which will be ready for distribution in the near future. An incomplete chart appeared in the paper which I read at the convention of the American Foundrymen's Association. The reason that the formula will not apply is that the slower cooling of larger castings enlarges the grain and thus weakens the casting. The more silicon the stronger the small castings and the weaker large castings. These two influences act in a very peculiar way in castings of the size of a 1" test bar, so that the strength does not seem to conform in any way with the percentage of silicon. This is the chief objection to a 1 inch test bar.

CONCLUSION: I am aware that I have not given you the definite answers that you requested, but I think that a thorough understanding of the lack of exactness in everything pertaining to cast iron is more nearly what you need. When you recognize this fact and look only for approximations, you will find that you will get what will be practical uniformity in your castings, and will save money by the process. I shall be glad to try again if I have overlooked any point you have made. W. J. KEEP.

---

### Among the Foundries.

The Lake Shore Foundry Co., Chicago, has made an assignment.

The Garden City Foundry Co., of Chicago, have made an assignment.

The Colvin Iron Foundry Co., at Providence, have become incorporated.

The Ulster Iron Works, at Saugerties, N. Y., has been sold to W. C. Gordon, of Albany, N. Y.

The Penn Steel Casting Co. has again broken the world's record in the casting of a 16-foot four-bladed propeller wheel for Roach's shipyard. The weight of the casting is 17,000 pounds.

---

We have received a very interesting and valuable publication entitled "Iron Making in Alabama," by William Battle Phillips, Ph. D., Consulting Chemist of the Tennessee Coal, Iron & Railroad Co., Birmingham, Ala., which treats with great minuteness that entire subject. The subject of the ores used and their various kinds and peculiarities, their treatment and value, receive, together with amount and value of product, an extended notice.

Especial attention and chapters are devoted to the subject of fuel, furnaces and iron works of different descriptions, while the grading of pig iron and freight rates to various American and European points are carefully considered. To anyone deeply interested in the subject of southern iron this report will be invaluable, and we feel sure will be carefully read.

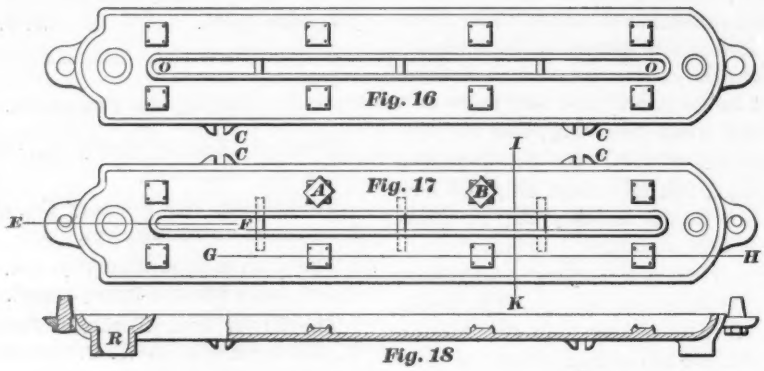
It is the first thorough report on this important subject that has been submitted, and its author has done much for Alabama in publishing it.

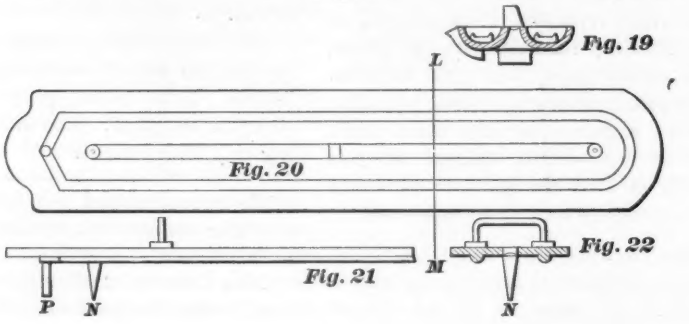
## The Manufacture of Radiators.

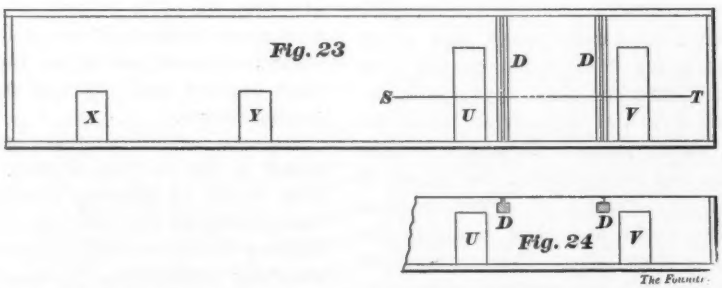
By H. HANSEN.

(CONTINUED FROM JULY, 1896.)

The mode of gating forms a subject that cannot be left to itself. A radiator is usually subjected to a hydrostatic test of not less than 100-pounds pressure per square inch, and as the castings are but 5-32 of an inch thick it will be seen that this is a gate should be capable of accommodating the flow of a large volume, but it should be so distributed as to leave but a small aperture. Skimming gates may be a help, a very small one at that; but the best preventive is a very thin gate extended over a considerable portion of the casting. It is a hard matter to convince some foundrymen of the necessity for proper gating, and some are spiked down to the methods they employ







rather severe ordeal for them to meet, and that any dirt which may have found its way into the mold is likely to exhibit itself in the form of a leak. Plugging is, of course, done, but the less there is of this the larger are the profits. Defective gates are nearly always at the bottom of dirty castings. The simply because they have seen others work the same way. This reminds me of a firm who went to the special trouble of sending a man on the road after pointers. The individual entrusted with this mission, succeeded after going through several creditable acrobatic exhibitions in escaping with

the gate of a radiator. Hugging it as fondly as if it were a nugget of gold, he made a bee line for his employers with the treasure. As it came from what was considered one of the leading shops of the country, no time was lost in remodelling their gates after it. It was about five-eighths of an inch square, and one of the finest gates for producing a

FIG. 25.

dirty casting, permitting slag and everything else to enter the mold. When I expressed my doubts as to the beauty of this purloined idea the foreman met me with the non-convincible reply that there could be no question about its genuineness, as he himself had secured it, and that its birthplace was right up to snuff, although he admitted

FIG. 26.

that castings poured with this gate caused more plugging and general loss than the others. Finally it was taken off and the trouble disappeared simultaneously. Moral: Don't believe all things are good because they come from a model shop.

One of the most important items in radiator making, to the neglect of which many a concern can trace small profits and even bankruptcy, is the absolute necessity for controlling the iron mixture, or, rather, the shrinkage of same. Iron may shrink a little more or a little less than it should in ordinary work, and after a few kicks people get used to it and the complainants die a natural death, but here the ghost will continue to walk until this matter is attended to. I will explain the reason why great care must be taken to produce a mixture having a uniform shrinkage. All cores are dried in half boxes or pans as they are called, and these should be as uniform as possible, or there will be something wrong that nobody seems able to account for. Take for instance the 45-inch radiator, length of core about 42 inches or 3½ feet. Suppose now that your iron shrinks 1-32 inches more to

FIG. 27.

the foot than it ought to, then you are out 7-64 inches from where you ought to be in the length of your core, and what difference this will make you can never judge till you come to handle a complicated and light casting, one of the most susceptible to fluctuations of this kind. If you go the other way your core will be too long, and with a casting that only calls for 5.32 inches of metal you would soon find some parts of it cutting through, and while you might be inclined to raise the devil with your coremakers for it, still you should look to yourself and the fine lot of core pans, hardly two alike, that lay at the bottom of the whole trouble.

Attempting to control your iron mixture by the analytical quotations furnished by the dealer will prove of but little value in practice. You may get an analysis with your pig iron that says one kind has 3.3205

per cent of silicon, and another 2.0923, and you estimate that your scrap has so much. Now, after you sit down and wrestle with figures like these, and the percentage of each kind of iron that you must get to strike it right; after you scratch your head to bring back to life some of the examples you used to work on the blackboard in your boyhood days; after you get the whole thing figured out, you may still be out, because you are basing your own calculations on the trustworthiness of the calculations of others.

What will give the best results if conducted with common sense is physical tests. Then it does not matter about the analysis for you are seeing right before your own eyes the results obtained, and don't have to trust implicitly to someone else's figures.

Don't furnish yourself what the writer was given once to control his mixture by. Suggesting to the superintendant the advisability of having something to go by, in-

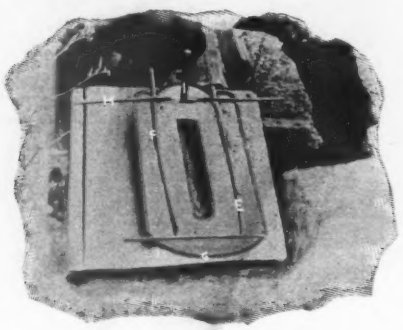


FIG. 28.

stead of looking wise when we were only full of ignorance, I was asked what I wanted. I explained in detail what I thought was right, test bars, etc. "I understand," was the answer, "I will get the test bars for you all right;" saying which he made a bee line for the carpenter, and had him plane up two pieces of pine according to specifications, or rather as near as he could come to it with the aid of a pocketknife, for that was what he used to square the ends. Offering my fond regrets that such a kind of test bars could not be depended on for anything, this superintendent yanked out a two-foot rule and blandly asked me if that was not close enough, and when I informed him of my inability to judge anything by such an outfit, he concluded that he could get near enough as he called it with it. Maybe he could, but to this day I am glad that I did not make a jackass of myself by being bluffed into accepting something that, instead of being a change recorder, actually was a change maker, for if you don't have a test bar reliable, it is just as apt to record a change when there is none as it is to remain inactive when a change actually does occur. This whole proceeding is what we meet every day—lack of exactness. Talk about the inhabitants from the backwoods wearing coonskin caps, we think this headgear would fit a great many foundrymen whose shops are supposed to be outside of the backwoods domain.

FIG. 29.

To show the perplexing problems that will appear even in a specialty shop, I will describe one small occurrence in radiator making, as it is out of the ordinary run of foundry epidemics. At figure one is illustrated a table pattern with a flask placed thereon. On one occasion the radiators from a certain floor would be thin towards the central portion; the pattern maker with surface gauge, callipers, etc., was called in to explain away the mystery, but failed as he pronounced everything all right. The trouble continued and all conceivable excuses were offered, and this is what at last explained the puzzle:

The molder after striking off the flask would, with the small piece of flat iron used for this purpose, hit the pattern at the center to jar the flask a bit as a help to get a clean lift. A raindrop will hollow out a stone, and hitting the pattern performed a feat something similar and calls attention

to what a great number of small licks will do. We know that it is possible to straighten a crooked casting by hammering it on the short side. In hitting the pattern the molder was unconsciously practically peening it about the center with the result that it lengthened, making the face of the plate to which the pattern was fastened concave instead of straight. This would make the mold convex and as both cope and drag were made from the same half pattern, the molder was closing two convex bodies against one another. Clamping these together until the joints touched exerted a greater pressure on the mold at the center, leaving the convex face of the mold extend too near the straight body of the core, causing the casting to be thin at this part to a sufficient extent to be noticeable. The origin of the trouble became plain enough when once located, and is mentioned here only to show how things can go wrong even after everything is once made right.

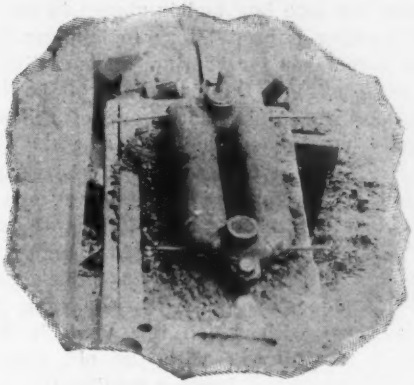


FIG. 30.

We have let the core room so far escape from our notice, not because there is nothing interesting to be seen there, since it is fully up to the foundry in progressive ideas and appliances. One of the greatest surprises that could be offered a common foundryman would be to let him spend an hour or two in the core room of some radiator shop out of everybody's way. In ninety-nine cases out of a hundred this would prove to him one of the greatest eye-openers he ever got, and it would not be mixed by a bartender either.

Cormaking embraces so many opportunities for a display of originality that we would naturally expect to find more attention bestowed on this subject, but in ordinary foundry work we seldom see any attempt to make the cores conform to the demands made upon it by the casting. We find the same kind of cores and being used for all purposes, for a variety from the light and complicated cores to the heaviest made. One feature that most foundrymen lose sight of is that it costs money to use rods, to take them out and straighten them, and that it also costs money to knock the cores out.

We do not want to say that coremaking is neglected, but rather that its possibilities are but slightly recognized. There are but

FIG. 31.

few who know how far they can make cores without any rods at all, and as for troubling themselves about the core sand coming out of the casting, why they leave that to some foreigner, who cannot swear in English and make his complaints understood. In radiator making the desideratum is a core sand mixture that will permit cores to be made without rods and readily leave the casting. As the metal very nearly covers the core the reason for striving in this direction is apparent.

There is a radical difference between what is commonly understood as coremaking and the making of radiator cores. The ordinary

way of making cores, venting them with wires or scratching a vent and pasting them together is one of the most tedious processes known in the foundry, and it is almighty slow at the same time when exactness is called for. In the radiator shops of to-day pasting is unknown; the vent wire has disappeared, and other tools have come to make better work and more of it.

In radiator making a system known as "booking" is followed. It derives its name from the cores being folded together in the same manner a book is closed, and forms the most rapid mode of turning out complete cores. Figure 16 shows the plan of corepan in which core is dried, while figure 17 shows its mate known as the packer, which is merely utilized to form the top half of core and then withdrawn. The square spots shown are for the reception of a tin on

FIG. 32.

which the chaplet may rest without entering the core. At A, B, figure 17, two of these tins are shown in position, while the small pin marks shown in each corner indicate a slight projection cast on the pan for the purpose of preventing the tin from slipping out of its place when the pan is being filled with sand. The lugs C form a guide by which the two halves may be closed together when placed on the inverted T rails shown at D, figures 23 and 24.

Figure 18 and 19 is a sectional view on the lines E, F, G, H, I, K. Figure 20 is the plan of ventplate, a tool as its name indicates, used for venting. Figure 21 is an elevation of same, and figure 22 a sectional view on the line L, M. The pins N are guides fitting the corepan at the place marked O, while the pin P makes and completes the vent through core print marked R. Figure 23 is the plan of core bench, while figure 24 presents a view on the line S, T, showing the arrangement of the blocks U, V, on which the prints of corepan rests to prevent the sand from falling through and the rails D on which the cores are folded together. The blocks X, Y, are for the use of a helper who fills the pans thereon and passes them to the coremaker for completion. We will try to give an outsider as complete an idea of this arrangement as possible with the aid of the photographic views, figures 25 and 26.

Figure 25 shows a coremaker and his helper at work. In some places the coremaker works singly, but this is a matter of choice and convenience. The helper has filled the core box and is shown in the act of leveling it preparatory to handing it to the coremaker for venting, an operation he is performing in the foreground of the illustration. At A' is shown one of the vent plates hanging on the wall, also the core-boxes B,' C.' At D' a number of cores are shown ready for delivery to the molder.

Figure 26 gives a view of the coremaker in the act of booking the core together, on which a thin coat of flour has been applied with a fine sieve. The speed, ease and cleanliness with which this work is done contrasts strangely with the old way of making cores and forms a combination that no one can help but admire.

Figure 27 shows the exterior of a core oven, or rather three of them, using as a fuel crude petroleum, compressed air being employed to atomize it. This fuel is one of the easiest regulated and permits of more cores being baked in a certain space and time than any other, and will recommend itself where core oven space is limited.

For comparing the progress of coremaking we will show a system for making radiator cores in vogue only a few years ago. Figure 28 shows the corepan filled and the rods e, f, g, h, i, placed to make the vent. Figure 29 shows a "skeleton," corresponding to top half of core placed thereon, the sand being introduced through the holes k, l, m, n, o, p. Figure 30 shows the skeleton removed and a core box taking its place, being

hammered down to form a perfect core and rearrange the rough spots left by the holes in the skeleton. This method made a core, too, and a fairly good core, but the stopping up of vents and the general unhandy changing around that had to be done made it comparatively slow and expensive.

Figure 31 is a fair example of the appearance of these cores, while at figure 32 it is held in a different position to show its strength. As it is made without rods and part of its cross sectional area is occupied by the vents, it speaks plainly for the severity of such a test.

The foregoing pages have not been presented here with a view to induce you to engage in the radiator business. They have been written because progress in one line induces progress in others. They are dedicated to the readers of THE FOUNDRY as a favorable proof that the foundry is making progress not only on paper, but in the shop itself as well.

---

### Pittsburg and Vicinity.

Business during the past month has continued within contracted limits in nearly all lines, partly as a result of midsummer conditions and partly on account of the disturbance of confidence by the political movements of the silverites and the Populists.

The fact is self-evident that the market in pig iron is overstocked, and it is also a fact that those furnaces which closed down for repairs a short time ago are again ready for operations. Many have increased their capacity from 50 to 100 tons and the question naturally arises, what is to be done with the increased supply, while the market now has nearly 800,000 tons of iron waiting for a market and prices cut to such a figure, that, furnacemen say, will not cover first cost?

It can be easily seen that the market is in a very unsatisfactory condition, both in crude and in finished, while the future prospects, point slightly to lower figures.

Labor difficulties are settled in some respects. The Mahoning and Shenango valley operators have agreed on the union wage scale for puddlers, giving the $4.50 rate, while some plants not recognizing the Amalgamated Association are also paying the same rate. It is hardly likely that any labor difficulties will be had this year, although the furnacemen's wages are not yet settled.

Foundries are not running to near their capacity and they could all stand plenty of more work. Some of the foundrymen hold that no business will be done until after the November elections, and after that, things will come with a rush. A recovery of prices is only a question of time, although with such large stocks it may require more time than people expect before the trade gets back to its normal condition. Ruling prices of today are as follows:

| | |
|---|---|
| No. 1 Foundry | $12.00 to $12.50 |
| No. 2 Foundry | 11.50 to 11.75 |
| No. 1 Charcoal Foundry | 16.50 to 17.00 |
| No. 2 Charcoal Foundry | 16.00 to 16.25 |

The cast iron pipe foundries are running fairly steady, with prices being held rather firmly.

Rolling Mill Castings.—Several large plants, calling for complete equipments, are now contemplated. This will serve to brighten up the local market somewhat. Prices are still steady and are quoted as follows:

| | Cents Per lb. |
|---|---|
| Chilled rolls, up to 12 inches | 3¾ |
| Chilled rolls, over 12 inches | 3¼ |
| Sand rolls and pinions, up to 12 inches | 2¾ |
| Sand rolls and pinions, over 12 inches | 2¼ |
| V tooth pinions, additional | ¼ |
| Housen and rolling mill castings | 2 |
| Squeezer castings | 2 |
| Squeezer pinions and wheels | 2½ |
| Spur and level wheels, large | 4 |
| Spur and level wheels, small | 3 |

Arrangements are now being made to locate a plant in or near this city for the manufacture of high grade machine tools by Lea & Carroll, of this city. A building 50x100 will be erected. Bids are also wanted for the necessary equipment. The plant will be of the most complete kind and the product to be of the highest class. The parties interested have had practical experience in this line, having been connected with several large concerns in the east.

The Aetna Foundry and Machine Company, Warren, has just shipped two 4-roll tin machines to the Crescent Sheet and Tin Plate Company, Cleveland, O., and two doubling shears, a squaring shear, a 6-roll Thomas and White tin machine and a More-

wood set to the Washington (Pa.) Tin Plate Works.

The Franklin Steel Casting Company is building an addition to its machine shop, core room and No. 1 foundry, which will measure 180x100 feet. The company is also adding an additional open hearth furnace, sand mill and two electric cranes, 35 and 15 tons each, together with additional lathes, shapers and saws, to take care of its increased business.

The Falcon Bronze Company, of Youngstown, is turning out a set of pure copper tuyers and coolers for the Struthers Furnace Company, which is now engaged in relining and partially rebuilding its furnace. A good order for bronze bearings is also booked for the Elwood Tin Plate Company, of Elwood City, Pa.

Excavations are being made near Connellsville preparatory to the erection of a smelting furnace for refining brass, copper and other high grade metals. Besides the refining plant a part of the works will be devoted to the cleansing of old waste and recovering the oil. Two mills, 40x100 feet, will soon be in course of construction, and before long two more like buildings will be erected.

The directors of the Girard Stove and Foundry Company, of Youngstown, held a meeting, a short time since, and elected the following officers: President, Thomas Parrock; vice-president and manager, W. J. Wallis; secretary, F. A. Williams; treasurer, L. S. Crum. A number of improvements in the plant are contemplated, and among them is a large traveling crane.

---

### A Few Pennsylvania Notes.

Penn Iron Works, Lancaster, Pa., closed for want of sufficient orders.

Marietta Casting Co., Marietta, Pa., are fairly busy, running five days.

Marietta Holloware & Enameling Co., Marietta, Pa., are fairly busy, running five days.

Baugher, Kertz & Stewart, York, Pa., are fairly busy, running full complement of hands.

Supplie Steam Engine Co., Columbia, Pa., are fairly busy on dry air heaters for house heating.

C. Ridgway & Sons, Coatesville, Pa., are busy as usual manufacturing the famous Ridgway crane.

Mountville Mfg. Co., Mountville, Pa., manufacturers of farm machinery and job work, are fairly busy.

The Hanover Foundry & Machine Co., Hanover, Pa., are busy, running full time on architectural work.

E. G. Smyser's Sons, York, Pa., are very busy on architectural work. Have sublet some work to a Pittsburg firm.

Broomal, Schmidt & Co., York, Pa., are running half time at present. They have recently finished up a large contract.

The Hubley Mfg. Co., Lancaster, Pa., manufacturers of iron toy specialties, are busy running full time and full complement of men.

Thomas, Roberts, Stevenson & Co., Philadelphia, Pa., closed for the present until they adjust the wage question with their molders.

Lukens Iron & Steel Co., Coatesville, Pa., are running four of their six furnaces in the steel plant. Plate mill running full, but not rushed.

The Columbia Grey Iron Co., Columbia, Pa., manufacturers of hardware and iron toy specialties, are busy and have plenty of orders ahead.

The Wrightsville Hardware Co., Wrightsville, Pa., are running full. They have also moved into their handsome new office adjoining the works.

The Monitor Steam Generator Co., Landisville, Pa., to make a short cut apparatus for house heating, are busy and are doing a nice up-to-date business.

A. B. Farquahar Co., York, Pa., are running five days a week with full complement of hands. Their specialty is farm machinery. They have a large foreign trade.

The Wm. Martin Brick Machine Co., Lancaster, Pa., are complaining of business being dull. They have recently equipped a new foundry. At present they are only employing six men.

The Downingtown Mfg. Co., Downingtown, Pa., manufacturers of paper mill machinery, are running their foundry three days each week, and no prospect of running full time for some time to come.

## Western Foundrymen's Association.

The regular monthly meeting of the Western Foundrymen's Association was held Wednesday evening, July 15, at the Great Northern Hotel, Chicago. The president occupied the chair.

J. B. Clements of St. Louis, Mo., applied for associate membership in the association and on motion was elected.

The secretary announced that at the last meeting of the board of directors it was decided on a motion duly passed that no regular meeting of the association be held in August. He also stated that the next meeting would be held in Cleveland in September and that notices will be sent to the members as soon as they are ready.

The paper of the evening, "Practical Value of the Various Metalloids in Cast Iron," was then read by its author, Maj. Malcolm McDowell; it is as follows:

### The Practical Value of the Various Metalloids in Cast Iron.

The iron master of to-day, manipulating the modern blast furnace and improved paraphernalia, backed up by the scientific knowledge of his chemist, sees in the immense piles of ores that lie in his yard great possibilities. The chemist begins the development of the ore. When the constituents and value of each kind of ore have been determined, the furnace man uses the information in making up the different charges to produce a certain specified grade of metal. An error on the part of the chemist or a mistake made by the furnaceman in combining the ores and their fluxes, or a failure to supply enough fuel or admit the air at a proper temperature would cause a failure in producing the grade of metal specified. While a scientific knowledge is essential, a practical application of the same is necessary, which is true not only for the blast furnace, but also in remelting the product of the cupola.

A large number of blast furnaces are run especially to turn out metal for steel-makers according to specifications laid down by the steel-maker's chemist who knows what grade of metal is necessary for his purpose. A few thousandths of one per cent more or less of certain metalloids will condemn the metal for making steel, but a percentage of phosphorus that would injure it for steel would not be objectionable in gray iron castings. So the grade of metal with this objectionable feature is called "off" or No. 2 Bessemer, and the foundrymen buy it for special castings. There are a few blast furnaces well located with reference to ores and fuel whose managers have taken the trouble to carefully and scientifically investigate the requirements of certain consumers and are meeting successfully their demands, sending out with each car of pig iron an analysis of the metal.

This method is proving satisfactory to both parties, for the foundryman, knowing what he gets, uses it intelligently and he can well afford to pay a premium for such metal. This will compensate the furnaceman for the extra cost of analyzing each carload shipped, especially as it relieves him of further responsibility. Northern blast furnaces running especially on foundry pig buy their ores where they can get them the cheapest. They are termed Lake Superior ores, and for this reason much is claimed for the metal they make, but only to a limited extent are these claims justified.

Southern blast furnaces that are favorably located with reference to fuel and ores are limited to local supplies, and for this reason whatever grades of metal they make show more uniformity than in Northern furnaces.

Each section grades its output by fracture, and numbers it from one to six, or from one to three, grading the remainder into forge, mottled or white.

The corresponding numbers of pigs from the Northern and Southern sections do not at all agree as to fracture, neither is there a reliable similarity in the corresponding numbers of furnaces in either sections.

It is possible for a furnace that uniformly runs on the same ores and fuel, to establish grades and numbers by making first a standard and establishing it by repeated chemical analyses. The granular formation is subject to changes caused by the different temperatures at which the metal is cast, but these variations, which are the exceptions, can be noted, and runs of this sort kept out of the general output.

There is either ignorance, indifference or carelessness in grading pig iron and shipping the same on orders based on claims made by sales agents as to the analysis of the metal made.

In addition to the different numbers and grades, there has been added another variation which is designated by letters added to numbers, as "No. 2P" or "No. 2X," the full significance of which is known by the sales agent only. One of the most unsatisfactory things connected with buying metal by analysis is the card issued, giving the analysis of certain brands by numbers, which usually does not correspond in the least with the iron delivered.

The great tonnage of pig iron is handled in the market by agencies. Some of these are directly connected with, or owners of blast furnaces and it is their business to sell the

output. In many cases they make the price, but more frequently it is made by the management of the furnaces which is often influenced by its necessities as well as by the fair legitimate competition of its neighbors.

In the offices of the different agencies are young men who are the sales agents on the road, representing the different furnaces. They are men with an honest, intelligent appearance and have an easy and agreeable address, with a fund of general information on all subjects, including statistics of iron made and sold in the world, especially in the United States, and more particularly by their firm. They have no scientific or practical knowledge of the making or using of iron. They don't need it. The foundryman has that, and they have the iron to sell, which has a reputation regarding which they are thoroughly posted. Among the many engaged as salesmen are some old veterans that have from experience formulated a "special mix," which usually consists of a variety of brands that they have for sale, in the make up of which is always a generous amount of "softener." This neutralizes any of the inequalities of the various "off" or unknown brands that are in the "mix." If this does not prove satisfactory to the foundryman, the sales agent reduces the amount of salable pig and adds instead more "softener." A salable pig will sell itself. It is the off or unknown brands which tax the salesmanship of the veteran, but it is this man the foundryman is always glad to see. The latter knowing little of the value or influence of the different metalloids in the pig, or what to specify for his work, likes to divide the responsibility of his guesses with the sales agent, and the more he has guessing the larger number there are between whom to divide the responsibility of failure.

Both men see the practical value of a "neutral pig" or "softener," but while it gives a metal that can easily be machined it often becomes spongy and weak just where it should not be, and thus there are constant failures in trying to produce a sound, solid, homogeneous casting that can be easily machined and has a fair measure of strength. The metal fails for the want of some other ingredient to counteract the effect produced by too much "softener."

A "softener" is not a "cure all" for all ills that metal is heir to.

The furnaceman and the foundryman are alike interested in knowing the value of each constituent element composing the pig that is made by one and used by the other, not so much a scientific expression of their value, but a practical demonstration that will enable the one to formulate a specification of his wants that the other may meet the requirements with as much ease and precision as he does the wants of the chemist of the steel-maker.

As a general thing, the foundryman does not know the chemical constituents of a metal that will make a casting for a special purpose. He buys a metal from the furnaceman that the one thinks and the other hopes will make what they want, neither are certain—both are guessing—each holding the other responsible if it fails, both claiming the honor if it succeeds.

There is quite as much anxiety among furnacemen as among foundrymen to know whether there is going to be any fault finding when castings are made of a lot of pig iron guaranteed to do a certain work. Out of all this anxiety from "guessing" is evolving a new condition. Here and there foundrymen are adding laboratories to their equipment, and the chemists are learning the value of certain metalloids in making special castings. The furnaceman is expressing a willingness to meet the requirements of the foundryman when he knows what it is he wants.

Furnacemen will learn for what kind of business their natural output is best adapted, and will turn their attention to some special grade and so perfect it, thus their natural advantages will give them the preference and quality will be quite as much considered as quantity.

Assuming the furnaceman is ready to fill specifications for grades of pig iron that will meet the requirements of the foundryman for his special work, it is then of great importance that the foundryman should know the value of the metalloids that combine with iron, and what should be their proportions to produce a certain grade or kind of casting.

There is, more or less, information scientifically expressed of the nature and relations existing between iron and carbon and the various influences exerted on them by the four different metalloids—silicon, phosphorus, manganese and sulphur. This information is not put in such a practical form as to designate the value of these

elements in making up a specification for certain grades of metal.

We know in a general way that silicon in certain proportions does hold carbon in combination and in other proportions uncombines, and eliminates it—that it gives fluidity to molten metal—to a limited extent prevents blow-holes, but under other circumstances promotes segregation and sponginess. It reduces a tendency to shrink or chill and alone does not make a strong casting, but is one of the most important metalloids that is combined with iron and carbon.

Manganese is equally as important as silicon, though almost directly opposite to it. It intensifies the affinity iron has for carbon, and when melted in its presence picks it up and combines it with the iron. It increases a tendency to shrinkage and chill, closes up the grain and makes it a stronger metal, frees it from blow and pin holes, prevents segregation and sponginess, but makes the metal hard and cold, short or brittle.

These two metalloids influence the relation between iron and carbon in the opposite direction, and neither by itself make a desirable casting, but combined in their proper proportions, they will give the best metal for a majority of work. Sulphur has little in it to recommend it to the favorable consideration of the foundryman. By some it is claimed to be a desirable ingredient in making a chill. It merely makes iron white and does not improve the chill, only increases its weakness. It is estimated that one atom of sulphur neutralizes ten of silicon, and when manganese is low the metal is divided into gray and white iron, assuming some very queer forms of distinct separation. When the manganese is sufficiently high these distinct lines of separation are broken up and the fracture shows a mottled bright gray or white, and the metal is hard, brittle and weak.

A few thousandths of one per cent of phosphorus will render metal unsuitable for steel making, but will not be objectionable in castings; on the contrary, is desirable for most work where fullness and fineness of casting is required, and as its tendency is to reduce shrinkage, it would gain strength by an increase of heat, a very desirable characteristic for many purposes.

In Howe's "Metallurgy of Steel," will be found the latest compiled information on the relation of these metalloids when in combination with iron, but there is nothing in that valuable work that gives the foundryman the value of these metalloids so that he may make up a specification for the furnaceman.

The majority of the foundry pig iron is used in foundries making specialties where the same mold is duplicated, requiring the same metal, day after day and year after year. The conditions are uniform and a metal to meet them is no more difficult to obtain than one to meet those requirements exacted by the steel-maker.

The difference between the foundryman and the steel-maker lies in that the latter knows the combinations and limitations of the different metalloids he wants, and the former does not, but when he does he will find plenty of furnaces well located for making his required grade of metal.

It is true, a blast furnace making foundry pig does not in each cast make one grade of metal only, but frequently makes all the numbers from one to six. Neither does the blast furnace running on metal for steel-makers; but the metal that would not meet the specifications would be the exception, and in each case this "off" grade metal from both kinds of furnaces would find sale in the large foundries whose chief reliance is in the cast scrap of the country to be carried by pig or a softener.

There are various grades of scrap cast iron which have been melted and remelted until they are depleted of all the desirable metalloids and have picked up all the undesirable ones. Much of this is tolerated because it is cheaper than pig iron. Still the iron in the scrap is equally as good as the iron in the pig metal, and all it requires is to be revived and any kind of casting can be made out of scrap that it is possible to produce from the best grades of pig iron, providing the foundryman knows the practical value of the different metalloids.

Nearly every foundryman has at times made an exceptional metal, but how he did it he does not know, nor has he ever since been able to reproduce it. Others have by experimenting with different brands of pig iron produced an exceptional metal, and as long as they were sure of the same pig they duplicated it. But what special metalloids acted in combination with the iron they were

unable to tell, and are no better off than the Ordinance Department of the United States Army is to-day as to what metalloid there is in "gun metal" that makes it what it is.

Back in the "Fifties" the United States Government made an appropriation for the ordnance department to experiment with reference to making a metal for cannon. Capt. Rodman was detailed to do this, and in July, 1856, he made the first heat. Preliminary heats were made to find the best pig metal to use in their mixture. They tried most all of the brands of charcoal pig then made, and selected a combination of "Greenwood" and "Salisbury," which were charged in the hot-air furnace, melted and cast into a pig, and this pig was again melted and cast into the gun. In their first heat the metal remained in the furnace over five hours, becoming, as Capt. Rodman says, decarbonized, and the test bar showed a tensile strength of from 38,000 pounds to 40,000 pounds, but was cold-short and brittle and was condemned. Subsequent heats brought the tensile strength below 36,000 pounds and 33,000 pounds, which proved satisfactory as the metal showed more elasticity.

The pig used was cold blast charcoal, the chemical analysis of which was not given, nor was there analysis of the resultant heats, but there was a marked difference shown by the physical tests.

Capt. Rodman claimed the "cold-short" heat of high tensile strength was decarbonized, but what the carbon or any of the other constituents were in the metal is not recorded, nor is there any record of a chemical analysis of the metal at any of the stages of these experiments. What it was or what it lacked chemically, that made one specimen test stronger than another, but cold-short, is not known.

If the United States Ordinance Department knows no more now than it did when "Rodman" formulated the specification for castings calling for "gun-metal," defined as charcoal pig metal melted in a hot-air furnace, they should be as interested in knowing the practical value of the metalloids that combine with iron in making special castings as the furnaceman or foundryman.

Failing to find records that give what is needed, and knowing from my own experience the great value of a knowledge of the relations which exist between different metalloids and iron in making castings, I think it would be advisable to make a series of experiments to determine these relations and their relative values.

I would use a cupola that would melt 1,000 pounds an hour, taking 250 pounds on the bed, tapping the latter amount into a ladle of that capacity from which I will take the tests necessary. Charcoal should be used as fuel until the desired metal is found, and then coke or anthracite coal used to determine their effect on the standard.

The tables and description accompanying Mr. McDowell's paper have been omitted owing to lack of space.

### Discussion.

Mr. Dickman, who was called upon, said: While I appreciate your courtesy, I feel at the present time I am a little too rusty on this subject to speak of it. Some year and a half ago I had the pleasure—as well as a small amount of labor—of going through an analogous set of experiments for Mr. Keep, but about that time my attention was turned into a different channel of work, and since then I have not been doing much in that line. I may state, however, that both for the scientific interest that we take in such matters, and for the general good that seems apt to result from a systematic investigation of the influence of these metalloids, Mr. Mackenzie and myself will offer to this association our assistance in these experiments, and assure you that our part of the work shall receive our best attention, and the benefit of our experience in the chemical part.

Mr. Pettigrew: Away back in the sixties one of the smartest men in the country took hold of pig iron, and this was Capt. Rodman. He took hold of the Ft. Pitt foundry and made a very decided success in casting his cannon. He had the United States government at his back. His idea was to have the outer coat of the gun keep a tight hold of the inner coat, and he was successful. He was the first man that ever introduced water into the cores, and he did it successfully. After the cannon was cast he turned on a stream of water right into the core and tested the temperature of the water until the gun was thoroughly cold. At the same time he governed the fire on the outside of the cast to keep the outside of the gun hot.

Most of you gentlemen that have seen castings broken have noticed that the castings straighten out instead of rolling up. Gen. Rodman's guns always rolled up when broken.

Mr. Sorge: The paper outlines a very exhaustive and complete line of work, which should be taken up by the Western Foundrymen's Association. The determination of the exact effect of the varying percentages of each metalloid in cast iron has been attempted partially by various experimenters, but there has never been a systematic series of experiments made on this subject. Everyone of us that mixes iron for castings and uses chemistry in doing this has a theory of his own on which he works to produce certain results. Maj. McDowell has his and I have mine. Whether they agree or not I do not know. It is a matter of shop secret, and each man keeps that thing to himself. I do not think this is best, however. I think that sort of thing is improved very materially by discussion, and whatever theory an individual has can only be based on his own limited knowledge. But if the work outlined by Maj. McDowell in his paper is carried out, it will give us a series of demonstrations that will enable us to state intelligently what the exact effect of each one of the metalloids will be. I consider it so valuable a paper that I think our association should take it up by appointing a committee for the purpose of carrying out these experiments. It is going to be a matter of considerable expense and one that the association must not lose patience about. It will take one, two or three years, possibly more, to work this out and the chances are that they will find great difficulty in obtaining the mixtures containing the exact amounts of the different metalloids desired, and it is going to take patience to get them. I think it is the most important thing, without exception, that is to-day before the foundrymen, and I hope to see the Western Foundrymen's Association take hold and carry it through to a successful issue. I believe it can be done. As to entering into the details that Maj. McDowell has brought forward, I think it is too early to theorize. I think that until we have these experiments before us and have the results in tabulated shape, so that we can intelligently look them over, we had better not theorize. There was another point which I failed to make. Mr. Dickman spoke of the series of experiments made by Mr. Keep. These papers have not yet come out, but they will at the next meeting of the A. S. M. E. We have received parts of them, but the fact is that the line of experiments was entirely in the direction of demonstrating the effect of silicon. Even there the tests were made to establish a standard of test bars more than to demonstrate the effect of the various metalloids.

Mr. Moore: I thoroughly agree with the writer of the paper on the desirability and necessity of the work that he has outlined, and I sincerely hope that this association can be instrumental in carrying it out. I, from my limited experience, have reason to doubt what little I sometimes think I know about the subject, and for the reason that there are so many combinations of elements dealt with that when one thinks he has arrived at a point where he knows something and can put a peg down, before he has gone very much further he finds that the thing he thinks was true is true only under certain conditions. As an illustration of that: Some time ago we had trouble in our castings from shrink-spots. The castings to which I refer are light castings and the shrink spots occurred where there were lugs or extra thickness. We found that we were running low in phosphorus, about one-half of one per cent. Our silicon was what we considered normal, between two and one-half and three per cent. We put our phosphorus up about one-quarter of one per cent, and we found that our trouble disappeared. There was no other change in the conditions. We set a peg down there that one-half of one per cent phosphorus is liable to produce shrink spots and that three-quarters of one per cent is all right. Well, that stood as good law until recently when my attention was called to a casting which had those identical shrink spots in it and an explanation was asked to account for them. I said it looked like low phosphorus. The casting was analyzed and showed three-quarters of one per cent phosphorus. The law was good until we struck some other combination and then the law did not hold. There was a very remarkable thing in connection with that casting. The sulphur was down to .035, which was extraordinarily low for light castings. Whether that was the changed condition that produced the result or not I

do not know, and that is not the point I want to raise to-night. I mention it to show how necessary is a comprehensive study of the elements in cast iron. I trust that the result from the reading of this paper will be that this association will take hold of this work and stick to it until we do know something positive about the relations of the metalloids in cast iron.

Mr. Sorge: I feel that it is due to Maj. McDowell to make the explanation that he has stated to me that he hopes the Western Foundrymen's Association will take hold of this matter, but that he intends to go ahead with it himself, if the association does not. I think that is a very laudable ambition on his part, but I think he will have an awful job to do it alone.

Maj. McDowell: This has been a subject that I have given a good deal of study, to ascertain what the state of the art was in this country as well as in the rest of the world, to see if I could not learn what had been done, so that if possible I could get hold of some place where others had left off. I here give a table showing eight heats that were made in England in a hot-air furnace, and two made by myself at home in a cupola:

| Number of heat..... | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| Total Carbon..... | 1.98 | 2.00 | 2.09 | 2.21 | 2.18 | 1.98 | 2.23 | 2.01 | 2.71 | 3.12 |
| Uncombined Carbon..... | 0.38 | 0.10 | 0.24 | 0.50 | 1.62 | 1.19 | 1.43 | 1.31 | 1.62 | 2.19 |
| Combined Carbon..... | 1.62 | 1.90 | 1.85 | 1.71 | 0.56 | 0.68 | 0.80 | 0.20 | 1.09 | 0.93 |
| Silicon ..... | 0.19 | 0.45 | 0.96 | 1.37 | 1.96 | 2.25 | 2.96 | 3.92 | 0.94 | 1.34 |
| Manganese..... | 0.14 | 0.21 | 0.26 | 0.00 | 0.60 | 0.75 | 0.70 | 0.84 | 0.60 | 1.25 |
| Tensile strength per sq. in. | 22,000 | 27,000 | 28,000 | 31,000 | | | | | 32,000 | 49,000 |

Eight of the ten different heats given in the foregoing table were taken from Howe's "Metallurgy of Steel," the other two heats I made. The first eight were evidently made in a hot-air furnace, while the last two were made in a cupola. Howe says in reference to the eight heats: "As silicon rises beyond 1 4-10 the percentage of graphite at first increases rapidly, then falls off slowly, while tensile and compressive strength both decline uninterruptedly, while experience shows that no one set of observations on the effect of foreign elements on iron is conclusive. Turner's results are so harmonious as to inspire confidence." The experiments of Mr. Thomas Turner here referred to are extremely interesting, but are not satisfactory, because they treat of iron made in a hot-air furnace and their results do not reach the quality of iron made in a cupola. As the general foundry practice in this country is with a cupola, what we want is the value of the different metalloids in combination with iron and carbon in making castings from metals melted in a cupola. The quality of our iron castings depends on the amount of carbon there is in them and its relations to the iron whether combined or uncombined. The two metalloids most seriously affecting these relations are manganese and silicon, the former intensifying the affinity iron has for carbon, while the latter under certain conditions eliminates and uncombines the carbon. Iron's capacity for absorbing carbon alone is limited to about 4.50 per cent, but when manganese is present in sufficient quantities it will carry from 6.50 to 7.50 per cent, and when chromium is substituted for manganese it will carry from 10 to 12 per cent in combination. Iron has a greater affinity for silicon at certain temperatures than it has for carbon and will absorb it to carbon's exclusion, so that silicon pig carrying from 8 to 10 per cent silicon has less than two per cent carbon. Where iron is low in carbon, say less than 2.5 per cent and silicon 1.25 per cent or less, the carbon will remain combined, but when the combined amounts of carbon and silicon are over four per cent graphite carbon is formed. No one knows the true value of the metalloids in iron. I have succeeded in making some first-class metal. I would not like to tell you what the mixture was, for the next time it was tried it might not do it. Therefore I had decided to go ahead with a series of experiments, feeling sure that there are a large number of institutions in this country that would be only too glad to take up a part of this work. I came to the Western Foundrymen's Association feeling this. It is one of the bright things in the world to know that there is an association of men,

who, like myself, are making iron. If we can form a combination of individuals out of this association to carry on these experiments it will be of very great value to the entire foundry industry.

Mr. Sorge moved that a committee of three be appointed by the chair to carry on a series of tests and experiments to determine the practical value of the metalloids in cast iron, and to carry on this work under the direction of the board of directors of the Western Foundrymen's Association. The motion was duly seconded by Mr. Pettigrew and passed by the association.

The president appointed the following as members of this committee: A. Sorge, Jr., Maj. Malcolm McDowell, and John K. Mackenzie.

A vote of thanks was tendered Maj. McDowell for his paper. A vote of thanks was also tendered Messrs. Dickman and Mackenzie for offering their services in the work. The meeting then adjourned.

---

## Mr. Francis W. Gibby.

Mr. Francis W. Gibby, president of the Mechanics' Iron Foundry Company, of Boston, Mass., and vice-president for the New England States of the American Foundrymen's Association, was born in St. John, New Brunswick, in 1833.

He entered the foundry in that city as an apprentice when he was fourteen and one-half years old, and served an apprenticeship of six and one-half years. At that time an apprentice was obliged to furnish bonds for $400, that he would serve his whole term out.

Before he was through his apprenticeship, he worked on the Big Floor, as the boys called it.

The work done in that shop was saw and grist mill machinery and steamboat and ship castings, which included a great deal of quite heavy work.

He came to Boston in 1856, and the first shop he worked in in that city was the Whiting Iron Foundry, it being the same shop that is now known as the Mechanics' Iron Foundry Co., of which Mr. Gibby is half owner. So many changes have taken place since he came into it, that the shop would not be recognized now as the same one.

He was put in charge as foreman and superintendent in 1861, in which capacity he served until the death of Mr. Whiting.

Mr. Gibby was one of the four that bought Mr. Whiting's interest, and he continued to act as superintendent for six years, when he sold out his interest.

In 1879 Mr. Gibby and his present partner, Mr. J. A. Caldwell, of Boston, bought out the Holmes & Blanchard factory, in Neponset, Mass., but it proved to be too far away from their trade, most of their customers being in Boston, so, the old shop being idle, they set about to secure it. This is the same plant that Mr. Gibby started to work in when first coming to that city.

Right here is a good chance to show an instance of the push and enterprise that has made their shop one of the foremost in the vicinity of Boston, Mass.

They ran off their last heat in the old shop in Neponset on Saturday night, and as soon as the bottom was dropped, commenced taking down the cranes, and by two a. m. on Sunday morning had the cranes down and loaded on teams and on their way to Boston, along with other material, making twelve loads in all on their first trip, the distance being about four and one-half miles. There was nothing in the Roxbury

shop on Saturday night, except coal and iron. They moved in all ninety loads on Sunday, had a gang of men at each end, and on Monday they started to work in their Roxbury shop, and had a cast of five tons on their first day. This is probably the quickest time in which a foundry was ever moved. To get entirely moved, it required about six months.

They now employ about one hundred and fifty men, and their works cover about two acres of ground. They turn out all kinds of work, both large and small, and are among the most successful foundrymen in or near that city.

Mr. Gibby, although getting along in years, being now sixty-three years old, is still actively engaged in the foundry business, being at the works early every morning, staying all day, and maintains a close supervision of the business in all its details.

He is always glad to see foundrymen from other parts of the country, and takes pleasure in having them come to see and talk with him when visiting his locality.

Mr. Gibby has a son who has a foundry of his own, employing about sixty hands, and who is president of the New England Foundrymen's Association, one son who is with him at the Mechanics' Iron Foundry, and another at Harvard College. He also has a daughter who is a practicing physician in Boston.

## Pokey's Pointers.

"What do you understand by a specialty shop, Tom?" said Pokey on one of his latest visits to the foundry, after Tom and him got through telling each other how cheaply they could make castings if they only had enough of them to make.

"As near as I have been able to find out, and that hasn't been very much," began Tom, "a specialty shop is a place where they try to get all the bright ideas they can from others and put two and two together and make four out of it, without letting any one know how they do it. A foundry operating as such, usually has a sign on every conceivable entrance, saying: 'No admittance,' and for fear someone should want to go in anyhow, a string of barbed wire is stretched around the works as an inducement for strangers to keep out."

"I guess you are about right, Tom; but don't you think that it is a devil of a way of doing business, this thing of making everybody's business your business, and then making your business your own?"

"We all do it more or less, or, rather, we do as much of it as we can. It is a common occurrence for a foundryman to work harder finding out what other people are doing than to tend to his own much-in-need-of-attention outfit. You remember—no, I guess you don't either, because it was your father who planned it—how I was sent up to Boomtown to find out how to make chilled rolls. Great guns, but that was a scoop. Got old man Nervins up there loaded up, and then with a little pumping made him disgorge all of his mixtures, and even had him make a sketch of his rigging. I came back and we made rolls without a hitch till the mill busted up."

"That was perfectly legitimate, though. Anybody could have done the same thing if they choose."

"Yes, and a couple of month's later I hired a dirty looking cur, and put him to work. He worked all right and quit at the end of six months; and later we found out that he was the vice-president of the Tuggins Metal Co., and that in his quiet, unostentatious ways he had laid hold of our recipe for making semi-steel."

"Yes, Tom, and that was a dirty low-down trick of that rascal to come here and state that he had seven children and a sick wife depending on him, when the darn liar had money to burn."

"That is what you think."

"And what do you think?"

"That depends on which way I look at it. What do you suppose the Tuggins Metal Co. think about it?"

Pokey shook his head.

"They believe that it was perfectly legitimate, as anyone could do the same thing if they choose."

"It was an outrage, Tom, and ought to be punished."

"That is what the people of Boomtown thought about us going up there after pointers; one's opinion on such questions is wholly a matter of taste, and changes according to the position in which you are located."

"I am going to leave you, Tom; you are training one of your pointers to hit back at

me. I have been shot that way before and don't enjoy it."

"Well, it is hard to allow others to treat us as we treat them."

"Tom, I don't want you to be pointing out a moral. There is no use for such a thing in our trade. Might as well try to use sawdust for facing as to put a moral in a foundry. Say! You know Dick Hartman, who used to be at the Aetna, a sort of peculiar to himself; all the time nosing around and then swapping his observations off for drinks. He came in yesterday and talked until I took him over and ran off a heat. Great fellow, if he only let liquor alone. He was telling me that Webster, of the Eureka, sent a man down to a shop in Boston, where they make the same class of work, after pointers, and that after being chased over a ten-foot picket fence, he escaped with a foggy conception of their way of working, and now when the Eureka tries to make it work, and are doing their best to carry on their shop like other people, some part of the combination is lost and that the largest part of their castings are making round trips through the foundry, taking the accommodation in the morning for the charging scaffold and coming back at night on the tap-out limited. He said it was a hot hole all around over there, 'and that if they did get a pointer down east they hadn't been able so far to develop it.' "

"Which ought to be a pointer for you at the same time," remarked Tom.

"In what way?"

"That it does not pay to imitate or steal others' ideas, for by doing so you are just as liable to pick up a bad thing as a good one. Some of these ideas that you pick up on the sly are red hot, and liable to burn you; may be left there a purpose with a string tied to them like a dollar on the sidewalk the 1st of April. If you take things that you are not wanted to have, you may, after all, pay a greater royalty than if you had inquired for the owner. The greatest stock in trade some shop managers have nowadays consists of nothing but precedents."

"That is just what I have been telling Widbur, Tom. The blamed cuss comes around and says we used to do so and so in the United States shops; and I say, blow the United States. Then he claims they had no emery stones in a shop in Philadelphia, because the castings were made so smooth that there was no need of such a thing, and I tell him to get out before I holler. Darn precedents, Tom. They are dynamite, and if you run a shop with them you will get blowed up just as sure as the Democrats will carry Texas. But what do you say if we go into some special line, and let the jobbing business die out; it is pretty badly decomposed, anyhow. After we get things agoing all we got to do is to put on the wind and count the castings. There won't be anything at all to bother about."

"That is news to me."

"Well, how can there be. You fix up a lot of boxes and all the molder has got to do is to fill them full of sand and pour them off."

"That is about all he does at any time, ain't it?"

"Yes, but things don't fit; he has got to set gaggers, wedge chaplets and file cores; that would all be done away with, and he could go right ahead, and we could use cheaper men maybe."

"I see that you are like a great many others of your kind. You have got it into your head that a well fitted up flask is going to do good molding, and can't help but do so. Good tools are a help towards good work, and that is all they are, too. You talk as if a good tool possessed brains, and was able to exercise judgment, and there is where you miss it when you hitch a poor man and a good tool together and try to make them pull simultaneously. When you come to think this matter over you might as well try to pair an ostrich and a native from North Carolina. One of them is sure to be balking all the time, and a cheap man can make a good tool balk quicker than anything else."

"It wouldn't cost much to try it, anyhow."

"Make up your mind that it will cost you twice as much as you think for to go to any special line. You remember how the Eureka took hold of the bath tub business; was just going to fly its kite right into prosperity. You remember the miserable failure they made of it; what do you think caused that?"

"Mr. Chunk, their manager, said it was because their foreman knew nothing."

"Yes, I know that is his story; but I am inclined to say that it was because Chunk himself thought he knew more than he

actually did. Chunk is one of these fellows who wants to run everything himself, and all he wants a person who is willing to carry the title of foreman for is, so that when the directors meet he can have somebody who can be suspected of having caused things to turn somersaults. When their foreman called for sand suited to the work, Chunk pigeon-holed this suggestion, because the New Era Sand Co., who gives him a rebate for orders, did not carry that grade. Then some machine work was needed on their flasks, and Chunk promptly sat down on this, because, as he said, the machine shop would be earning nothing by doing so. Couldn't possibly earn money, you know, working for themselves. Pinholes had to be drilled true, and Chunk came out in the foundry and danced an Irish can-can; wanted to know if the foreman had lost his core boxes; that he should think of throwing such work into the machine shop. When the castings were lost because the flasks shifted or run out, Chunk appeared on the scene with a face on him fit to scare a Chinese Joss, and preached that he would be hanged if he could see any reason for having a 50 per cent loss in the foundry. If you want to follow his example, it won't cost much, and you can make a great deal—of deficit."

"If it takes money, Tom, I will be keelhauled if I am going into it. What I am looking for is something that money can be made from without any chance of coming out at the small end of the horn. Come up to the house next Sunday, Tom; fetch your wife along and take dinner with us. Come early as I have a scheme on my mind."

---

## JAMES CHALMERS.

### The History of a Tramp Molder.

W. EDWARD.

### CHAPTER XXVII.

Work slacked up very suddenly at Allen's, and I, in company with several more, was laid off for a few weeks. Smith thought the slack-up would be only temporary, and that inside of two weeks they would be busy again, but I concluded to get my ticket from the brotherhood and "pull my freight" for some other city, as St. Louis was beginning to pall on me. The trouble was that I got in with a gang who were great on the booze (and St. Louis in August is enough to drive almost any man to drink), and the "can" got to coming too strong for me. Every morning I would go out with a head about three sizes too large for my hat, and by the time it had simmered down to its normal size in the evening some of the gang would be after me, and the temptation to repeat the operation would be too strong for me to resist. So long as I stayed in St. Louis I would have to stand by the gang, and I concluded that the only way to break away was to leave the city. Barnett and Mitchell tried to persuade me to stay, and said they could work me in over at Todd's, in East St. Louis, but I had made my arrangements to leave before I saw them, and I was not to be dissuaded.

It was on the regular meeting night of No. 40 that I was laid off, and as I had put up my initiation fee, I went up to "ride the goat" and get my ticket, which I was assured by a number of the hoboes was almost as good as a regular pass with the railroad men, as they all belonged to brotherhoods of their own, and the name appealed to their union sentiments.

After the meeting I had a farewell bowl with the gang, several of whom accompanied me to the yards of the Missouri Pacific, while Johnny Eagan "fixed" me for a ride to Kansas City on a through freight. Having everything fixed for me with one of the "brakies," I had good luck on this run about dark; but I was nearly starved, having had nothing to eat since supper time Saturday night, as I preferred sticking to the train to getting off for something to eat and running the risk of having to lay over along the road for a day or two. I wasn't very favorably impressed with Kansas City, there being too many hills to climb to suit me, and I had a notion my stay there would be very brief unless I could strike a job there that suited me more than usually.

After I had put away a good supper under my vest, and was nosing around the depot pondering the situation and wondering whether to go on to Omaha or to stay there and look for a job, someone slapped me on the shoulder so hard that it almost knocked me over. I wheeled in a moment ready to defend myself, but as soon as I caught a glimpse of the face with a broad grin on it I recognized "Billy" Robinson, who had worked side partners with me at the Chicksaw in Memphis, and in a moment we were

shaking hands and asking each other where we came from.

"Bill" had come up from Springfield three days before I struck the town, and he reported work very "bum." There were two jobs to be had, but they didn't pay the wages, and neither of us were working for fame or to improve our knowledge, unless the collateral went with it. I proposed that we go up to Omaha, as I had originally intended, and from there to St. Paul and Duluth, working our way down through Hancock, Milwaukee and Racine to Chicago, as the weather grew colder, but "Bill" said he had met two hoboes from the north the day before, and they reported work slack all along the line, so we came to the conclusion to break direct for Chicago, and if we couldn't strike anything there to go on east. There was nothing to keep us in Kansas City, and Bill was for starting at once, but I had just come in from a twenty-hour ride, and I was in no shape to go banging around in a box car for twenty or thirty hours longer until I had had a good night's rest; besides, it was Sunday night, and there was not much show of catching a train anyway, so we put up for the night.

On Monday we hung around the Wabash yards all day long watching for a cattle train for Chicago. I had never tried riding with the cattle, but "Bill" was onto the racket, and claimed we could make almost as good time as a regular express train, and there would be less risk of our being fired than there would be from a regular freight, as if a "brakie" saw us he would think we were tending the cattle. I let "Bill" talk me into this scheme much against my will. I thought as he had been there before he knew what he was talking about, but it will have to be a very urgent necessity which induces me to try it again.

We slid a front door open, and after crawling in among the cattle pushed it back and fastened it. The car was packed with steers until there was just room enough for them to stand, but those next to us crowded over and gave us all the room we wanted. If I had tried this trip alone I would have got into the hind end of the car as readily as the front end, and very likely have been crushed to death when the train started with a jerk; but "Bill" was onto this, and insisted on the front end, and even then we had to climb up near the roof to keep out of the crush every time we heard the whistle for brakes. We had barely room to turn round and had to keep on our feet all the time, as the bottom of the car was too dirty for us to sit down, and it would have been dangerous to attempt it as the steers next to us were liable to step over any minute, and we had to keep prancing around to keep from being trampled on.

By the time we got to Mobberly, the end of the first division, I had had enough and would willingly have gotten off and walked, but "Bill" insisted on sticking to it to the end of the next division at least. As it was pitch dark and raining, I concluded it was better "to bear the ills we had than fly to those we knew not off."

When the train started again I tried a scheme to get a more comfortable position for riding than standing up, and prancing around to keep out of the way of the steers, who by this time had become very familiar with us and leaned on us occasionally with absolute contempt of the punches and kicks which we administered to make them move over, crawling up the end of the car I reached my leg over and straddled the nearest steer, settling myself comfortably on his back. The steer didn't like this worth a cent, and he snorted and cavorted around, crowding over against the nearest steer in the effort to shake me off, but I lay lown on his back and put my arms around his neck, keeping my feet up so that he couldn't break my legs. When he found that he couldn't shake me off he quieted down and I got so comfortable after awhile that I actually went to sleep. "Bill" had climbed up as high as he could get in the corner of the car to be out of danger, and await the result of my experiment, and as soon as I got my steed quieted down and told him how comfortable it was, he mounted the next one. "Bill's" steed made more fuss than the one I was on, bellowing like a frightened calf for a while, and kicking up until he almost broke "Bill's" back against the roof of the car. This started mine to going again, and for five minutes we had a picnic trying to subdue our fiery steeds.

It would have been funnier than a circus to any one who could have seen the show, but there wasn't any fun in it for us, and we would gladly have given up the fight if we could have gotten off safely. Fortunate-

ly there was not enough room for them to turn around, and the train was running so fast that they had to content themselves with bellowing and prancing around, and we stuck to our seats. My steer finally quieted down again, and stood so still that I went to sleep, but "Bill's" steer was restive all night and took every opportunity to try and shake him off, so that he had a most uncomfortable time of it, and spent most of the time swearing at the steer and at me for laughing at him.

We would have left the train at the end of the second division, but we arrived there just at daylight, and some of the cattle men came along the train to see if any of the steers were down. Our mounts were both very quiet and nothing was seen in our car to attract their attention, so they passed on down the train, but came back and sat down on the roof of the car next to us. "Bill" was for getting off anyway, but I told him that we might as well stay where we were until we got to Decatur, where the cattle would be fed and watered.

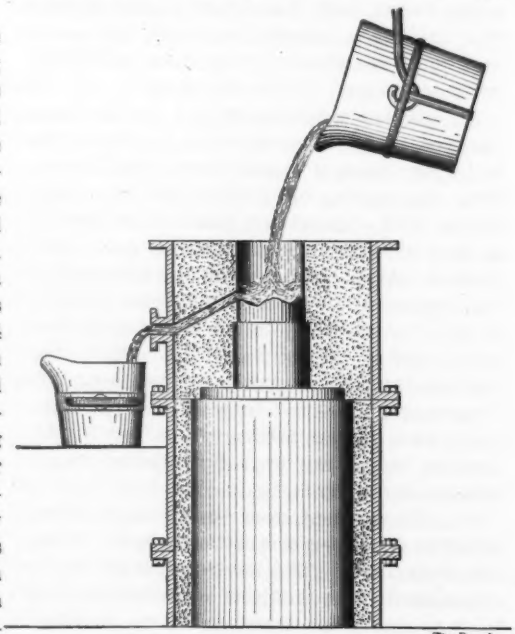
The next division seemed longer than the other two, as we squirmed around trying to find comfortable positions. The steers began to get restive under our weight and threatened to begin their antics to dislodge us, and as our seats were none too comfortable we slid off and stood up until the train reached Decatur, where we got off and swore never to try a loaded cattle car again.

We skirmished around Decatur and got a good dinner; then we went back to the yards to look for a train to Chicago. About 4 o'clock a freight train pulled out in which there was a number of empty box cars, and without waiting to ask any questions, supposing, of course, as the train was heading in that direction, that it was bound for Chicago, we jumped on and stowed ourselves behind the grain door of an empty box car. None of the "brakies" bothered us and we settled ourselves for a sleep as soon as it got dark, counting on our arrival in Chicago early in the morning. When morning came, however, the train was still jogging along, and there was no indication of an approach to the city. Neither of us were familiar with the stations we passed, and hadn't the slightest idea of where we were until I caught sight of a signboard calling attention to a certain brand of whisky for sale by an Adrian liquor store, and then I tumbled to the fact that instead of taking a train on the Chicago division we had caught one on the main line of the Wabash, and were now nearer to Detroit than we were to Chicago. When I told "Bill" of my suspicions he laughed at me, but about 10 o'clock the train pulled into Adrian and he was forced to admit I was correct. "Bill" wanted to get off and take the first train back for Chicago, but I had never heard very good reports of the shops in that city from men who had worked there, and I was just as well satisfied to go on; so we stuck to our box car and reached Detroit about 2 o'clock in the afternoon, having made the run from Kansas City inside of two days.

(To be Continued.)

### Burning Wobblers and Necks on Rolls.

The article in the July number of THE FOUNDRY on the subject of burning a wobbler on an eight-inch roll slightly amused me, as I have had so much of it to do during my foundry experience, and the foundry-



*The Foundry*

BURNING WOBBLERS AND NECKS ON ROLLS.

man who has never done or had to do a job like it cannot be said to have had a very extensive experience in machinery shops.

I have worked at the business for thirty years, and during much of that time there has hardly been a week when we have not

burned a wobbler or neck or both on rolls or pinions from eight to twenty inches in diameter, and I do not remember a single failure. There is little that is new or original about burning or grafting wobblers or necks on broken rolls; in fact, it was regarded as an old practice when I went to work in a foundry.

I have always rammed the neck up in green sand. It makes a shorter job.

It is not necessary to clip the wobbler off, as all that is wanted is a perfect union and the melting of the neck. One-quarter of an inch is just as good as if it were melted for one foot.

We always arrange the outflow just at the fracture, so that the hot iron will come in contact with the surface to be burned. After there has been enough iron run through to melt the surface, which can be easily determined by judgment, the outflow hole is stopped up with a stopper, as one would stop a cupola, the balance of the neck is filled up and the iron that is run off in the overflow is carried away and formed into anything suitable.

The accompanying illustration shows our method sufficiently plain to make further explanation unnecessary.

E. J. CONDON,
Foreman Birmingham Iron Foundry,
Derby, Conn.

## CORRESPONDENCE.

### More Cupola Discussion.

East Jordan, Mich., July 29, 1896.

Editor of THE FOUNDRY:

I have noticed with great interest the articles on cupola management, and especially the criticism of Mr. E. Grindrod by Mr. N. Portz, in April number. Mr. Portz states that they are running a 30-inch cupola, putting on first charge 160 pounds of coke and 1,250 pounds of iron, then alternating charges of 75 pounds of coke and 1,250 pounds of iron.

This would be, supposing he puts on five charges, a melting rate of about one pound of coke to thirteen and one-half pounds of iron, or nearly so, and if more than five charges, better than that.

We would not question the veracity of Mr. Portz, but would advise him to figure up the amount of castings made and amount of coke purchased, allowing say 10 per cent for gates, etc., and see how it tallies with his statements.

We wish to state that the amount of coke Mr. Portz uses in the bed is insufficient, and if we put on the iron, say using one-half pig and one-half scrap, it would fail to melt it so that it would be of any use whatever in a foundry. We believe Mr. Grindrod is about as near right as Mr. Portz, both being impractical. If Mr. Portz had doubled his coke charge on the bed, making it 320 pounds of coke instead of 160, he would have come very near actual practice, instead of talked of practice.

We believe few 30-inch cupolas are melting the year round at better than one to nine, or at best one to ten, and consider this good practice if the iron is melted hot, and this is what foundries need, and anything less is no economy.

We believe there is a little too much atmospheric phenomena connected with some of the articles written on cupola management, and we trust we may be favored with a little more of the practical in the future.

Respectfully yours,
WILLIAM E. MALPASS.

### Water Pressure at Two Hundred Feet.

A crushed mass of cast metal now lying in a scrap yard at Pittsburg demonstrates the tremendous pressure of water at a great depth. It was constructed for a diving bell, and was intended for use in Lake Michigan. As originally constructed it was a cube about six feet square, tapering slightly at both ends. The material was phosphor bronze, five-eighths of an inch thick. Each plate was cast with a flange and they were bolted together, the bolts being placed as closely together as was consistent with strength. The side plates were further strengthened by ribs an inch thick and two inches wide, and the entire structure was strongly braced. The windows, intended to be used as outlooks by the divers inside, were three inches square, fortified with iron bars and set with glass plates an inch thick. The entire weight of the bell was 23,000 pounds. When completed it was sent to Milwaukee and towed out into the lake about twelve miles, where there was over two hundred feet of water, and was sent down for a test. The manufacturer of the

bell was so confident of its strength that he wanted to go down in it on the test trip. It was well he did not. When it had reached a depth of about two hundred feet, strong timbers which had been attached to it came to the surface in a splintered condition. Suspecting an accident, the bell was hauled up and found to be crushed into a shapeless mass. The inch thick plate glass bull's eyes were pulverized and the entire body of the bell forced inward until none of its original outlines remained. On a basis of two hundred feet depth, the pressure that crushed this seemingly invulnerable structure was 86.8 pounds per square inch, or 353,924 pounds to each side of six feet square. The total pressure, therefore, on the cube was 2,723,548 pounds, or 1,361.7 tons.—Indianapolis Journal.

## Questions and Answers.

J. W. M. J. says: I am a melter and am having some trouble with unclean castings. The chief trouble seems to be the prevalence of a number of small holes containing sand or slag.

It may be the fault of the molders and perhaps the fault of the melter or the iron, and I would be glad to see some opinions expressed through the columns of THE FOUNDRY. We ordinarily use half good scrap and half pig iron, though we have at times varied this without any good result.

F. M. J. says he is having trouble with some car wheels that they are making, owing to a tendency to crack in the rim and arms. The diameter of wheel is 25 inches, diameter of hub 6 inches by 8 inches deep. Rim 1⅛ by 5 inches, inclusive of flange, 8 straight arms, ⅞ by 4 inches, thickness of chill, 3 inches.

He says they take the chill off as soon as metal is set and cover rim with sand, and that the cracks appear in both rim and arms.

W. W. W. would like to hear from some of the readers of THE FOUNDRY who are using a report sheet for keeping a record of the work done in the foundry. He wants to see some of the forms used for recording amount of fuel and iron placed on each charge, weight of good castings, scrap, sprues, etc. Anything in the way of record sheets will be welcome, and THE FOUNDRY will gladly publish them.

## Notice.

**Advertisements entitled Situations Wanted, or Situations Vacant will be inserted in this column One Insertion FREE. All others, 25 cents per line.**

FOREMAN molder for radiator shop; must thoroughly understand his business. Address Holland Radiator Company, Bremen, Ind.

FOREMAN who thoroughly understands enameling cast iron by the wet process. Address box No. 25, care THE FOUNDRY.

FOR SALE—No. 3 Root blower, used only few months; to be replaced with largest size. Address box 4, care THE FOUNDRY PUBLISHING CO.

A FOREMAN, patternmaker, is open for engagement. Is familiar with every description of green and dry sand and loam work; good references. Address box 26, care THE FOUNDRY.

WANTED—A position as brass foundry foreman; have had twelve years' experience as foreman and can give the best of references as to ability. Address box 14, care THE FOUNDRY.

FOR SALE—One 6,000 capacity screw ladle, made by Obermayer & Company; been used about two dozen times and kept out of the weather. Address S. A. DENYER, box 158, Thibodeaux, La.

WANTED—A first-class brass molder, one accustomed to electric railroad work and general jobbing; steady position and good wages to right party. F. H. KORETKE, 922 Magazine st., New Orleans, La.

FOUNDRY FOREMAN desires to make a change; can give best of references; age 33 years; experience on light and heavy machinery and architectural iron work. Address box 20, care THE FOUNDRY PUBLISHING CO.

FOR SALE OR TO RENT—Foundry and machine shop; one of the best locations in the city, having railroad facilities and fully equipped with modern tools and appliances. Address Box 30, care THE FOUNDRY.

WANTED—A first-class foreman for the management of a core shop where about forty coremakers are employed. Location of shop, within ten miles of New York City. Applicant should be familiar with piece work system. Address, stating experience, P. O. Box 14, Brooklyn, New York.

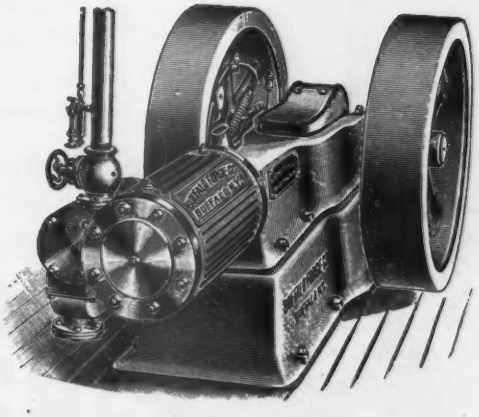
The S. Obermayer Co. are sending to the trade a neatly worded postal card advertising foundry molasses.

They claim to make a specialty of a grade peculiarly adapted to foundry purposes.

CUPOLA BLOWER.

For the latest development in Cupola Blower construction and application, see BUFFALO FORGE Co.'s 1896 Sectional Catalogue, "America's Best, the World's Standard."

BUFFALO FORGE Co.'s Automatic Cut-off Engine, Horizontal and Upright types for Electric Lighting and Power purposes, direct connected or belted. 1896 Sectional Catalogue furnishes full details.



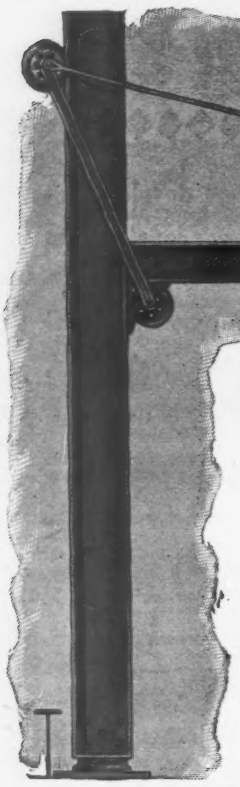
CLASS "A" HORIZONTAL

TUMBLING BARREL EXHAUSTER.

Tumbling Barrel Exhausters are easily applied, thoroughly efficient, and change casting cleaning rooms from a death-dealing pestilence to a comfortable working apartment. Send for details.

**BUFFALO FORGE CO.,**
BUFFALO, N. Y., U. S. A.

CHICAGO, 22-24 W. Randolph St. NEW YORK, 26 Cortlandt St.



DO YOU NEED **CRANES?**

**WE MAKE CRANES**

. . . . ASK FOR OUR PRICES ON CRANES

With our special tools we make **Flange Pipe** at low cost. Let us name you prices when you require . . . .

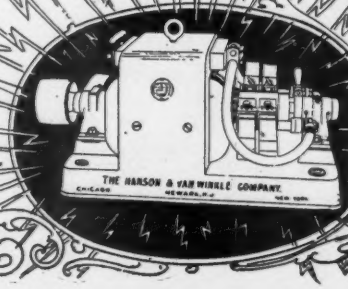
**HUB OR FLANGE PIPE AND FITTINGS.**

We may be able to supply them to you at less than your cost. . . . . .

**The Addyston Pipe and Steel Co.**

CINCINNATI, OHIO.

**NICKEL-PLATING OUTFITS**




THE
HANSON & VAN WINKLE
—COMPANY.—
NEWARK, N.J.
CHICAGO. NEW YORK.

# Alphabetical Index to Advertisers


| | PAGE |
|---|---|
| Adams Co., The | 32 |
| Addyston Pipe & Steel Co. | 24 |
| American Glutrose Works | 36 |
| Ayers, E. M. | 5 |
| Berlin Iron Bridge Co. | 8 |
| Borden & Selleck Co. | 32 |
| Boutelle, L. W. | 30 |
| Brass Founders Supply Co. | 37 |
| Brown & Sharpe Mfg. Co. | 26 |
| Brooklyn Fire Brick Works | 34 |
| Buffalo Forge Co. | 23 |
| Chicago Flexible Shaft Co. | 31 |
| Cleveland Nickel Works | 30 |
| Coburn Trolley Track Co. | 16 |
| Clement & Co, Frank H. | 31 |
| Connersville Blower Co. | Back Cover |
| Cowles Electric Smelting and Aluminum Co. | Inside Cover |
| Craig Ridgway & Sons | 17 |
| Diamond Machine Co. | 36 |
| Diamond Clamp and Flask Co. | 37 |
| Dixon Crucible Co., Jos | 39 |
| Egan Co., The | 33 |
| Fay & Co., J. A. | 33 |
| Foundry Outfitting Co. | 21 |
| Garden City Fan Co. | 35 |
| Garden City Sand Co. | 40 |
| Gobeille Pattern Co., The | 32 |
| Gould & Eberhardt | 30 |
| Green, C. H. & Co. | 33 |
| Hanson & Van Winkle Co. | 24 |
| Ingersoll Sergeant Drill Co. | 28 |
| Kilbourne & Jacobs Mfg. Co. | 29 |
| Keep, W. J. | 31 |
| Lansing Wheelbarrow Co | 28 |
| Millett Core Oven Co. | 26 |
| McCullough-Dalzell Co | 4 |
| McCormick & Co., J. S. | 34 |
| Obermayer Co., The S. | 1 |
| Paxson & Co., J. W. | 2 |
| Phœnix Iron Works Co. | 14 |
| Roots Company, P. H. & F. M. | Colored Insert |
| Sellers, Wm. & Co. | 20 |
| Shaw Electric Crane Co. | 19 |
| Smith Foundry Supply Co., The J. D. | Cover |
| Springfield Facing Co | 34 |
| Sorge Jr., A. | 36 |
| Stewart, W. H. | 35 |
| Stover Mfg. Co. | 29 |
| Sturtevant & Co. B. F. | 10 |
| Stow Mfg. Co | 37 |
| Syracuse Chilled Plow Co. | 38 |
| Tabor Mfg. Co. | 9 |
| Taylor, Robt. J. | 6 |
| Tompkins, Vreeland | 35 |
| U. S. Graphite Co. | 38 |
| Washington Coal and Coke Co. | 12 |
| Whiting Foundry Equipment Co. | 22 |
| Whitehead Bros. Co | 3 |
| Wrought Iron Bridge Co. | 7 |
| Wilbraham Baker Blower Co. | 11 |



# THE FOUNDRY

The only foundry paper published in the world, and an authority on all matters pertaining to the foundry business.

## RATES OF SUBSCRIPTION.

Single subscription to all parts of the United States and Canada, $1 per annum.
" " Universal Postal Union, 1.75 "
Eight or more subscriptions at one time, 75 cents each.

## ADVERTISING RATES.

| | | |
|---|---|---|
| One page - - | per month, | $20.00 |
| Half page - - - | " | 12.00 |
| Quarter page - - | " | 7.00 |

When space is specified an extra charge of five per cent. on the above figures will be made. All pages between front cover and reading matter reserved for whole page advertisements.

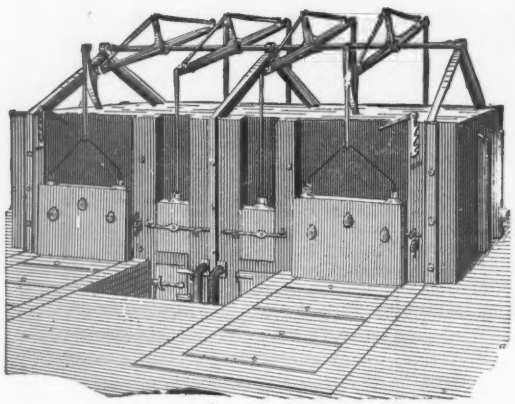
Advertisers in THE FOUNDRY have the privilege of discontinuing their advertisements at any time after they have had three insertions, and will only be charged pro rata for the number of insertions printed. They also have the privilege of changing advertisements as often as desired.

The publishers of THE FOUNDRY appreciate the fact that it is customary for publications, especially the class known as Trade Journals, to quote a rate for advertising from which greater or less discounts are given, according to the persistency of the advertiser. This system is manifestly unfair as tending to show partiality. We have deducted the usual discount before quoting rates thus giving it to all alike, and no reduction of any sort on the abov rates can be made.

Copy for advertisements should be in by the 25th of the month preceding publication.

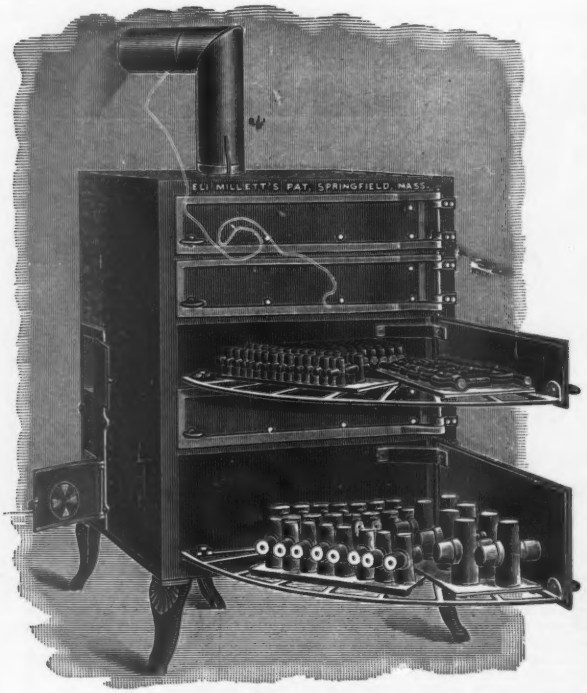
# BROWN & SHARPE MANF'G. CO.

PROVIDENCE, R. I.



Foundry Rattlers
Annealing Ovens
Sanitary Closets
Core Ovens
Case-Hardening Furnaces . . . .

FINE CASTINGS A SPECIALTY.




## Millett's Patent Core Oven

THE BEST IN THE WORLD.

No Foundry using small Cores can afford to be without it.

Over one hundred and fifty in use.

SEND FOR OUR NEW CATALOGUE GIVING NAMES OF THOSE USING THEM.

Millett Core Oven Co.

BRIGHTWOOD, MASS.

For Sale by J. W. PAXSON & CO. Philadelphia, Pa.

# BUYERS' DIRECTORY.

**ALUMINUM.**
Cowles Electric Smelting & Aluminum Co., Lockport, N. Y.

**AIR HOISTS.**
Whiting Foundry Equipment Co., Harvey, Ill.

**BARROWS, TRUCKS, ETC.**
Kilbourne & Jacobs Mfg. Co., Columbus, Ohio.
Lansing Wheelbarrow Co., Lansing, Mich.
Syracuse Chilled Plow Co.

**BLOWERS.**
Buffalo Forge Co., Buffalo. N. Y.
Connersville Blower Co., Connersville, Ind.
Garden City Fan Co. Chicago, Ills.
Root, P. H. & F. M. Company, Connersville, Ind.
Sturtevant Company, The B. F., Boston, Mass.
Wilbraham Baker Blower Co., Philadelphia, Pa.

**BRONZES.**
Cowles Electric Smelting and Aluminum Co., Lockport, N. Y.

**CHARCOAL.**
Springfield Facing Co., Springfield, Mass.

**COKE.**
Washington Coal and Coke Co., 7 Wood St., Pittsburg, Pa.

**CORE COMPOUNDS.**
American Glutrose Works, Philadelphia, Pa.
Stewart, W. H., 182 Front St., New York.
Vreeland Tompkins, Jersey City, N. J.

**CORE OVENS.**
Millett Core Oven Co., Brightwood, Mass.

**CORE OVEN CARS.**
Lansing Wheelbarrow Co., Lansing, Mich.
Kilbourne & Jacobs Mfg. Co., Columbus, Ohio.
Foundry Outfitting Co., Detroit Mich.
Whiting Foundry Equipment Co., Chicago.

**CRANES.**
Addyston Pipe and Steel Co., Cincinnati, O.
Craig Ridgway & Sons, Coatesville, Pa.
Harrington, E., Sons & Co., Philadelphia, Pa.
Phœnix Iron Works Co., Cleveland, Ohio.
Shaw Electric Crane Co.
Wm. Sellers Co.
Whiting Foundry Equipment Co., Harvey, Ill.

**CRUCIBLES.**
Joseph Dixon Crucible Co., Jersey City, N.J.
McCullough-Dalzell Co, Pittsburg, Pa.
Taylor Crucible Co., Robt. J., Philadelphia, Pa.

**CUPOLAS.**
Foundry Outfitting Co., The, Detroit, Mich.
Whiting Foundry Equipment Co., Harvey, Ill.

**FIRE-BRICK.**
Brooklyn Fire Brick Works, Brooklyn, N. Y.
Garden City Sand Co., Chicago, Ill.
Obermayer Company, The S., Cincinnati, Ohio
Paxson, J. W., & Co., Philadelphia, Pa.
Smith Foundry Supply Company, The J. D., Cincinnati, Ohio.

**FLEXIBLE SHAFTS.**
Stow Flexible Shaft Co., Binghamton, N. Y.
Chicago Flexible Shaft Co., Chicago, Ill.

**FOUNDRY LADLES.**
Foundry Outfitting Co., The, Detroit.
Obermayer Company, The S., Cincinnati, Ohio.
Paxson & Co., J. W., Philadelphia, Pa.
Phœnix Iron Works Co., Cleveland, Ohio.
Smith Foundry Supply Company, The J. D., Cincinnati, Ohio.
Whiting Foundry Equipment Co., Harvey, Ills

**FOUNDRY PLANS.**
Foundry Outfitting Co., The, Detroit, Mich.
Whiting Foundry Equipment Co., Harvey, Ills

**FOUNDRY SUPPLIES.**
Springfield Facing Co., Springfield, Mass.
Foundry Outfitting Co., The, Detroit, Mich.
Joseph Dixon Crucible Co. Jersey City, N J.
J. S. McCormick Company.
Garden City Sand Co., Chicago, Ill.
Obermayer Company, The S., Cincinnati, Ohio
Paxson & Co., J. W., Philadelphia, Pa.
Smith Foundry Supply Co., Cincinnati, O.
The U. S. Graphite Co., Saginaw, Mich.
Whitehead Bros. Co., New York.

**IRON BUILDINGS.**
Berlin Iron Bridge Company, East Berlin, Conn
Wrought Iron Bridge Company, Canton, Ohio.

**IRON FILLER.**
Vreeland Tompkins, Jersey City, N. J.

**MANGANESE AND SILICON.**
Cowles Electric Smelting and Aluminum Co., Lock port, N. Y.

**MOLDING MACHINES.**
Tabor Mfg. Company, 39 Cortlandt st., New York.
The Adams Co., Dubuque, Ia.

**MOLDING SAND.**
E. M. Ayers, Zanesville, O.
Foundry Outfitting Co., The, Detroit.
Garden City Sand Co., Chicago, Ill.
Paxson & Co., J. W., Philadelphia, Pa.
Whitehead Bros. Co., New York.

**NICKLE PLATING OUTFITS.**
Hanson & Van Winkle Co., Chicago.

**PATTERN MAKERS.**
The Gobeille Pattern Co., Cleveland, Ohio.

**PATTERN MAKERS SUPPLIES.**
Frank H. Clement Co., Rochester, N. Y.
The J. A. Fay & Egan Co., Cincinnati, Ohio.

**PLATERS SUPPLIES.**
Hanson & Van Winkle Co., Chicago.

**POLISHERS SUPPLIES.**
Hanson & Van Winkle Co., Chicago.

**SAND SIFTERS.**
Wm. Sellers & Co., Philadelphia, Pa.
Taylor, Wilson & Co. Allegheny, Pa.

**SAND BLAST.**
Goodrich, & Co., F. A., Detroit, Mich.

**SNAP FLASKS.**
Diamond Clamp & Flask Co, Richmond, Ind.
Green & Co., C. H., Syracuse, N. Y.

**SPRUE CUTTERS.**
Gould & Eberhardt, Newark, N. J

**TROLLEY TRACKS.**
Coburn Trolley Track Mfg. Co., Holyoke, Mass

**TUMBLING BARRELS.**
Brown & Sharpe Mfg. Co., Providence, R. I.
Paxson & Co., J. W., Philadelphia, Pa.
Stover Mfg. Co., Freeport, Ills.
Whiting Foundry Equipment Co., Harvey, Ills.

**VENTILATOR IRONS.**
Delvin, Thos. & Co. Philadelphia, Pa.

# Tubular Steel Tray Barrows.

PAINTED BLUE.

Style A 2 to A 8. Fig. 253.

The trays of these barrows are made of one piece of steel, of the same thickness throughout. The expense of repairing wooden barrows is greater than the original cost, and the loss of time so increases the expense that the steel barrow is cheaper in the end.

These barrows are made to dump forward, and are so constructed that at the dumping point they will not run back on the operator. The wheels are made with gray iron hubs with round iron spokes shouldered at tire, passing through and riveted on outside. It is impossible for the spokes to become loosened from either tire or hub. Tires are 1¾ in. wide. Wheels revolve on ⅝ in. bolt through hub.

**WRITE FOR CIRCULARS AND PRICES.**

**We make all styles of Warehouse Trucks and Wood and Steel Barrows.**

## LANSING WHEELBARROW CO., LANSING, MICH.

# AIR * COMPRESSORS

## IN FOUNDRIES

High Grade Compressors

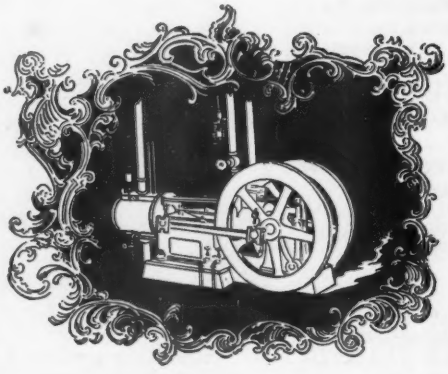
Steam or Belt Driven

Manufactured by

THE

## Ingersoll-Sergeant Drill Co.

Havemeyer Building, New York.



Send for Catalogue.

WORK WONDERS

USED FOR

Sand Blasts

Lifting Castings,

Placing Cores in Position, etc.

# "Columbus" Steel Tubular Wheelbarrow.

Made throughout of the best quality of high grade steel. Tray stamped without joint, seam or rivet, with edge bound over steel rod. Handles, Legs and Wheels the strongest put upon Tubular Barrows.

Made in nine different sizes. Largest manufacturers in the United States of TUBULAR BARROWS, STEEL CHARGING BARROWS and WOODEN BARROWS of every variety. Write for catalogue to

## The Kilbourne & Jacobs Manufacturing Co.

LINCOLN STREET, COLUMBUS, OHIO.

# STOVER'S IMPROVED

# EXHAUST TUMBLING BARREL

The Stover Egg Shaped Barrel does double the work of any other with less noise and power. It gives the contents a double motion or action—from ends to center and from side to center—causing a thorough mixing and rubbing together of all the parts contained therein, cleaning and polishing the contents better and quicker than any other form of barrel.

Sent on 30 days approval to any responsible manufacturer of light castings, malleable iron wire nails, or any other small articles that require cleaning and polishing.

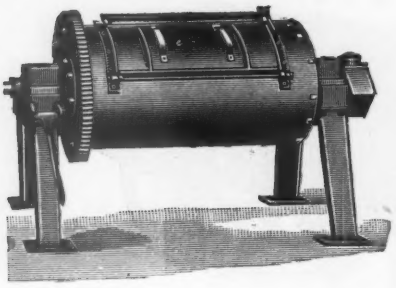
For full particulars, address,

## Stover Manufacturing Co.

205 RIVER STREET,

FREEPORT, ILL

# SEVERAL PEOPLE . . .



Responded to our last card on the subject and have since

# TUMBLED

**Their Castings by our Improved Method, much to their satisfaction and profit.**

**You are in business for Profit, and money saved is money earned.**

**Send for Catalogue of our IMPROVED MILLS.**

## CLEVELAND NICKEL WORKS,

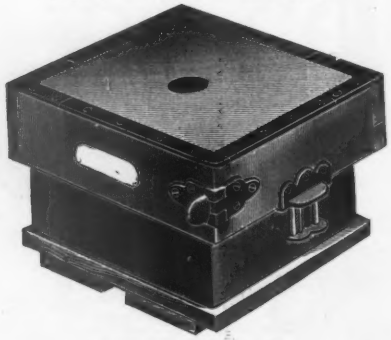
CLEVELAND, OHIO.

MANUFACTURERS OF

IMPROVED TUMBLING MILLS and STOVE RODS, SCRAPERS, POKERS, TOWEL RODS and NICKEL PLATED STOVE TRIMMINGS.

## Boutelle's Improved Snap Flask

**FOR HEAVY WORK.**



PATENTED JULY 17, 1894.

**NO STRAINING OF WORK.**

**SAVES** Floor Space
SAND
TIME
MONEY

**Send for Circulars and Price List,**

**L. W. BOUTELLE,**
ORANGE, MASS.

## Eberhardt's Patented Sprue or Gate Cutter

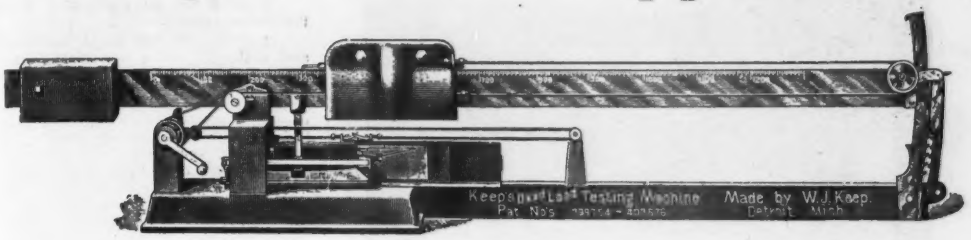
*Dear Sir :*—The machine fills the bill; am just delighted with it.
Yours truly,
Maryland Brass & Metal Works,
Baltimore, Md.

**Price Low**

**Send to**

**GOULD & EBRHARDT,** NEWARK, N. J.

# "Keep's Test" Apparatus.




**HERE IS WHAT ONE LARGE CONCERN SAYS:-IT HAS PAID THEM, WHY NOT YOU?**

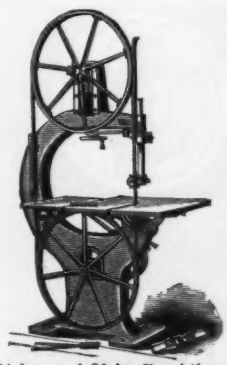
DETROIT, MICH., March 31st, 1896.

*Mr. W. J. Keep, City:*

DEAR SIR: We have regulated our foundry mixture by "Keep's Test" during the past year, and can recommend it in highest terms. We know exactly what we are doing and can keep our castings of uniform quality. We find that .160 inches per foot the best shrinkage, and have been able to keep the average strength of a test bar ½ inch square and 12 inches long at 450 pounds.

Very truly yours,
LELAND & FAULCONER MFG. CO.,
H. M. LELAND, Vice-President.

**To SAVE MONEY** IN YOUR OWN FOUNDRY, ADDRESS **W. J. KEEP, Detroit, Mich.**



34 in. and 36 in. Band Saw Machine.

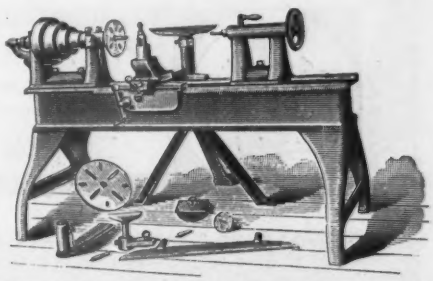
## .. Complete Outfits ..

FOR

## Pattern Shops

STRICTLY FIRST-CLASS TOOLS.

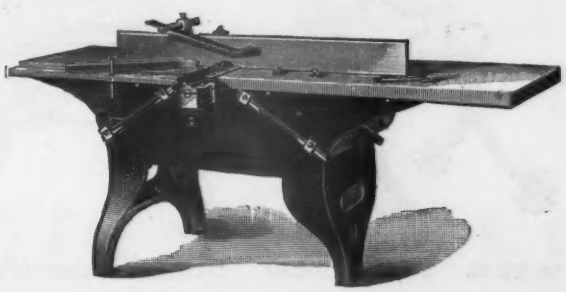
MANUFACTURED BY



Pattern Makers' Lathes. Iron Bed with or without Carriage.

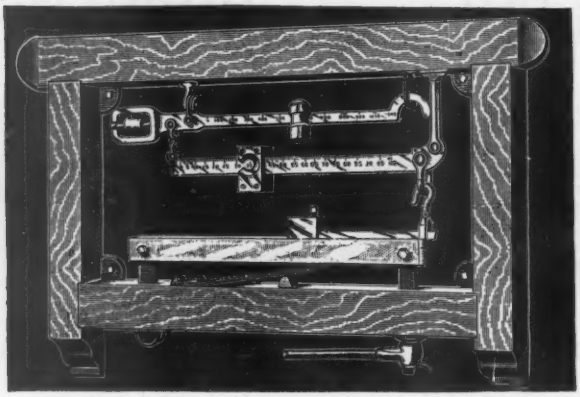
**THE FRANK H. CLEMENT CO.** 336 LYELL AVENUE, ROCHESTER, N. Y.

No. 1 Variety Saw Bench. All Iron and Steel.



# SPERRY'S TESTING MACHINE

## For showing Transverse Strength of Foundry Test Bars.



If you are interested in Testing Machines (an Iron Founder cannot afford not to be) we wish to show you what our machine will do for you.

**Results can be compared with published tables.**

It gives you the breaking strain and deflection of a one-inch square specimen one foot long, fixed at one end, weight applied to the other. This determination is standard. Your results may be compared with published tables. (See Haswell on Strength of Materials.) No other low cost machine does this. The broken end of specimen is only about two and one-half inches long and can be marked and filed away for future reference.

The specimen does not require balancing as in other machines. The pressure applied can never be anything but the resistance of the specimen.

No floor space is occupied. A wall space of seventy by forty-two inches is all that is required. The machine frame is constructed of 6x6 timber, nicely moulded and finished in hard oil. The Scale Beam is finely nickel-plated, has no loose weights and is made by the Howe Scale Co. As a whole, the machine is an ornament to your office or shop.

**Price, Complete as shown above, $100.00.**

# BORDEN & SELLECK CO.

**48 and 50 LAKE STREET, CHICAGO.**

---

BE WISE

**PATTERNS FOR CASTINGS.**

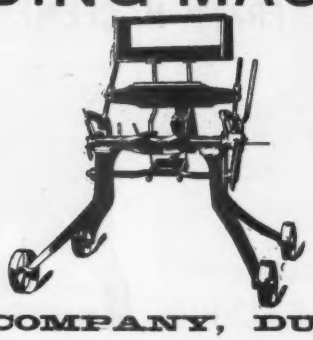
**ANYTHING,** from a Toy Pistol to a Steel Plant.
Largest Pattern Works in the World.

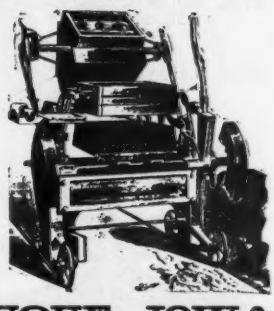
**The Gobeille Pattern Co., Cleveland, O.**

BE WISE

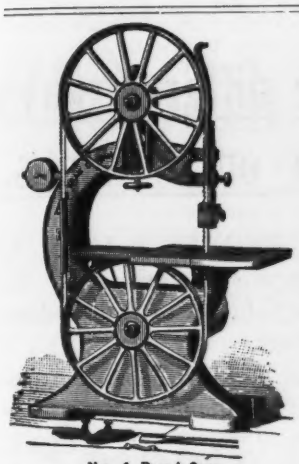
---

**FARWELL'S MOULDING MACHINES** Send for Catalogue

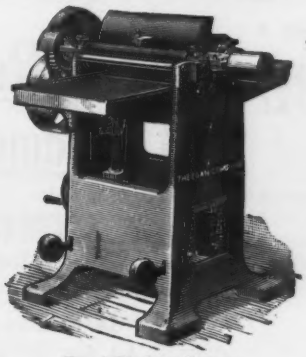




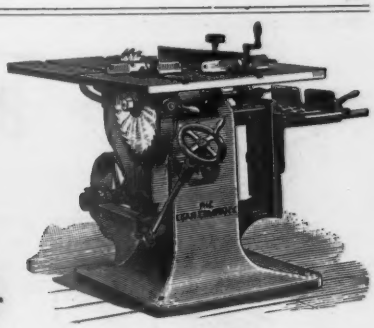
**THE ADAMS COMPANY, DUBUQUE, IOWA**



No. 1 Band Saw.
Iron Tilting Table.



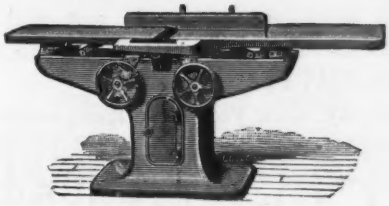
No. 1 Surface Planer.



No. 3 Variety Saw.
Tilting Table and Boring Attachment.

# Wood Working Machinery

FOR PATTERN MAKERS.



No. 2 Hand Planer.

Complete Line.
Prices and Particulars on application.

## THE EGAN CO.

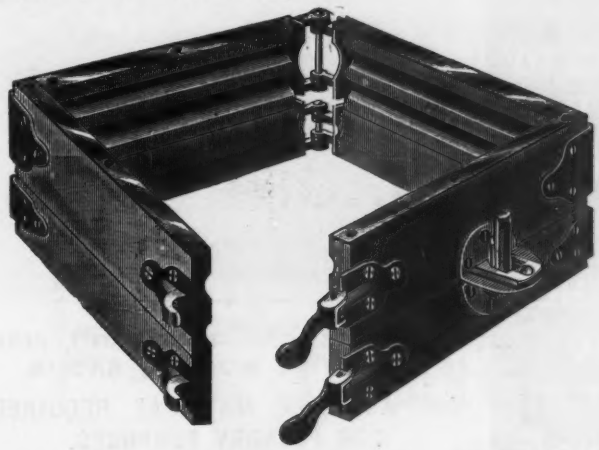
417-437 West Front Street, - - CINCINNATI, OHIO.

We are the Largest Manufacturers of **SNAP FLASKS**

**IN THIS COUNTRY, FOR TWO REASONS.**

**First**—Our Flask has been found to be the best in the market and foundrymen insist upon having them, no matter who they buy of.

**Second**—Making them in such large quantites and using the most improved machinery enables us to sell them cheap.



**That is all there is to it—**

**QUALITY and PRICE.**

Made by skilled mechanics out of the best kiln-dried lumber and with all malleable iron fittings.

If you desire discounts, write us and mention *The Foundry*.

## C. H. GREEN & CO. 1400 GRAPE STREET. Syracuse, N. Y.

HOLDING ON

## There are different ways of holding on to things.

SOME PEOPLE hold on to their money instead of investing it; others hold on to their orders, which is just as bad.

As for us, we "hold on" to our customers, or they hold on to us, either way is just as good.

That is simply because we furnish the best goods at the lowest possible price.

High sounding titles do not make good castings. It is QUALITY that tells and it is QUALITY we deal in.

Some day, after you have tried everybody else, you will send us an order, and there will be more "holding on."

J. S. McCORMICK CO. PITTSBURG, PA.

WE BURN HARDWOOD

CHARCOAL

FOR FIRES.

CAR LOTS DELIVERED TO ALL PARTS OF THE U.S.

OUR CHARCOAL FACING FOR

BRASS FOUNDRIES

IS UNLIKE ANY OTHER.

IT WILL PAY YOU TO KNOW ABOUT IT.

SPRINGFIELD FACING CO.

SPRINGFIELD, MASS.

ESTABLISHED 1854.

Brooklyn Fire Brick Works

CUPOLA BLOCKS, FIRE SAND, FIRE CLAY, FIRE MORTAR, KAOLIN

AND ALL FIRE MATERIAL REQUIRED FOR FOUNDRY PURPOSES.

Send for Illustrated Catalogue and Prices.

88 Van Dyke Street, BROOKLYN, N. Y.

# "Smooth On" Cores

"SMOOTH ON" LIQUID T COMPOUND CORES

A liquid compound for making cores.
Prepared ready for use to mix with the sand, for LARGE and SMALL CORES.
Intricate cores can be made without rods.
Will not absorb moisture and will keep any length of time.
Are hard, strong and will bake with clean, sharp corners.
All castings will be true to core size.
Will not blow or sputter.
Works with new or old sand.
Try it and be convinced.
Send for circular and sample.

# "Smooth On" Castings

"SMOOTH ON" IRON T COMPOUND CASTINGS

**Will stop a hole steam tight or Repair a defect in Castings and often save 100 times its cost in time and money in repairing defects in Cast Iron Patterns or other Castings . . . . . .**

**VREELAND TOMPKINS,** Manufacturing Chemist, 533 COMMUNIPAW AVE., JERSEY CITY, N. J.

---

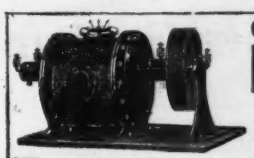
# W. H. Stewart's ..LIQUID.. Core Compound

**Used by the Principal Foundries in the U. S.**

Prepared ready for use in **LIQUID FORM** to be mixed with the regular core sand. The cores are **DAMP-PROOF** and do not absorb moisture. **SPUTTERING** and **BLOWING** by reason of damp cores are avoided. The cores are **HARDER, FIRMER** and **STRONGER** than can be made by any other process and cost less to make. They can be set at any time and **EASILY CLEANED FROM THE CASTING.** Send for our descriptive pamphlet with prices and directions for use.

**W. H. STEWART,**
SOLE MANUFACTURER,
182 FRONT ST. NEW YORK.

---



GARDEN CITY POSITIVE PRESSURE BLOWER
NO GEARS
SAVES 10 TO 15% IN POWER
SIMPLE — POSITIVE — EFFICIENT

WRITE FOR CATALOGUE.

GARDEN CITY FAN CO. CHICAGO ILL U.S.A.

**DUDLEY ENGINEERING CO., 39 CORTLAND ST., NEW YORK**
EASTERN AGENTS

# Diamond-Huntington Suspension Grinder

(FRONT VIEW)

**ESPECIALLY ADAPTED TO FOUNDRIES.**

**THIS MACHINE** is unsurpassed as a dry grinder. It is practically noiseless, does not jar the building, is light and springy to the touch, the emery wheels wear true down to the flanges; the work does not bump on the wheel, and can be cut down by it quicker than any other style of grinder. We have testimonials from many manufacturers as to its good qualities, which we will send to anyone interested on receipt of their business card.

We make a very large line of other styles of Grinding Machinery about which we cheerfully furnish any information desired.

**DIAMOND MACHINE CO.**

**PROVIDENCE, R. I.**
**CHICAGO, ILL.**

# GLUTROSE

**(Trade Mark.)**

## The Universal Liquid Core Compound

**Patented in the United States, England, France and Belgium.**

GLUTROSE was invented and is manufactured by a practical foundryman of many years' experience. It has been used in the Pennsylvania Railroad foundry at Altoona and other large foundries for the past three years with the most satisfactory results.

It is cheaper than any other compound in use, takes the place of all other materials and never varies in quality.

Makes the most difficult cores for iron or brass of any size.

The cores come out easily and leave the castings smooth.

Will let the air and gases off from a core which is difficult to vent, better than any other material in use and makes no offensive smell or smoke.

**Will Never Blow the Castings.**

## AMERICAN GLUTROSE WORKS

OFFICE: **PENN MUTUAL BUILDING,**

**No. 925 Chestnut St., Philadelphia.**

# A. SORGE, JR., M. E.

**ADVISES and Reports on**

## Foundry Practice and Equipment

**1533 Marquette Bldg.,**

**Chicago, Ill.**

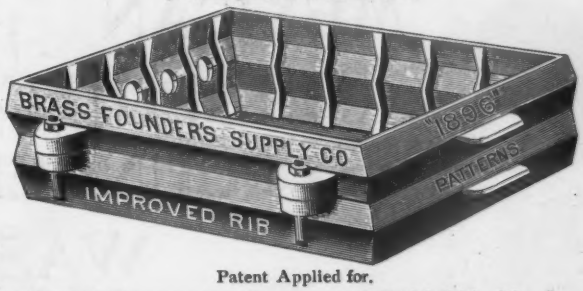
# THE BRASS FOUNDERS SUPPLY CO.,

(Formerly R. M. BARNETT CO.)

Makers of

FLASKS
FURNACES
FOUNDRY

Supplies and Specialties.




Patent Applied for.

The Improved

RIB, BEVELED,

and

Special Designs.

ORDER

THE RIBBED

IT IS BEST!

Stronger and Cheaper than any others.

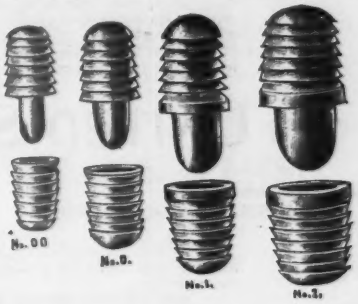
R. M. BARNETT, J. S. MUNDY. — 30-34 PROSPECT STREET, NEWARK, N. J. — Write for Catalogue.

---

THE DIAMOND

# Brass Dowel Pin

FOR WOOD PATTERNS.




Put in the same way as the wood pins.
No trouble to the pattern maker.
It is used by all the leading houses.
Send for samples, hanger and price list.

## DIAMOND CLAMP AND FLASK CO., RICHMOND, INDIANA.

---

## THE CHICAGO FLEXIBLE SHAFT CO.

MANUFACTURERS OF

Largest Facilities
Lowest Prices

Flexible Shafts

UNDER AN

Improved Process,

insuring great strength and increased durability.

WARRANTED THE BEST

Superior Shafts for all purposes. Also special and standard

Tools and Appliances

Send for Catalogue

CHICAGO FLEXIBLE SHAFT CO.

Nos. 142-144 Ontario St. CHICAGO, ILL.

---

## STOW MF'G. CO.

BINGHAMTON, N. Y.

INVENTORS AND MANUFACTURERS OF THE

STOW FLEXIBLE SHAFT

—FOR—

PORTABLE
DRILLING
TAPPING
REAMING
WOOD BORING
EMERY GRINDING
BICYCLE DRILLING, ETC.

PORTABLE EMERY GRINDER

This tool is almost indispensible for cleaning and grinding heavy castings, buffing and polishing all metals and glass. It runs Emery Wheels, either flat or on edge. Hundreds in use giving perfect satisfaction.

General European Agents,

SELIG SONNENTHAL & CO,

85 QUEEN VICTORIA STREET,

LONDON, ENGLAND.

Write for Catalogue and Price List.

# MEXICAN GRAPHITE FOUNDERS' WASH

The guaranteed equal of any Silver Lead Facing. Applied with hand, shake-bag, or brush. Mixed in water, it makes A Perfect Wash for cores and dry sand work. Made from the pure product of our Graphite mine in Mexico, owned and operated by ourselves. This Facing is our specialty and is in use in over 900 foundries in the United States and Canada. It will save you over $5.00 per barrel in first cost alone, and is submitted subject to your entire approval.

## THE UNITED STATES GRAPHITE CO.

Graphite Mines—
TORRES, SONORA, MEXICO.

Office and Factory—
SAGINAW, MICH, U. S. A.

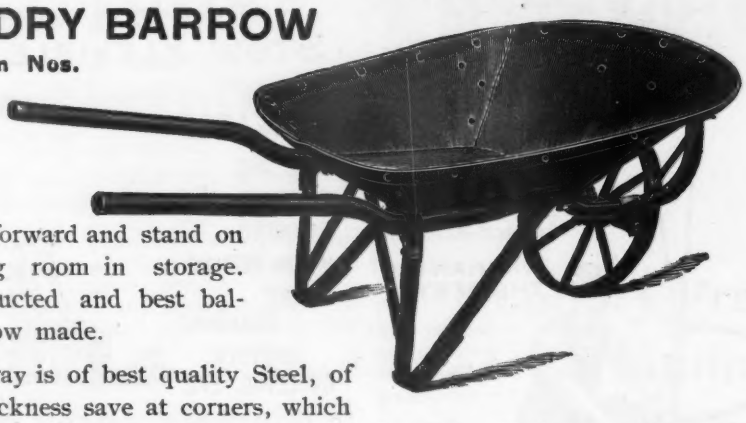
NOTE.—Don't fail to ask us for some pencils. They are the finest in the world, and we keep them for gratuitious distribution, and esteem it a pleasure to supply them on request.

At a low estimate the world's production is 700,000,000 pencils annually. Nearly every high grade pencil, and over half of all the pencils made (over 350,000,000 per year) are made from our Mexican Graphite.

# "SYRACUSE" Steel Wheelbarrows

## FOUNDRY BARROW

Ten Nos.



All dump forward and stand on end, saving room in storage. Best constructed and best balanced Barrow made.

The Tray is of best quality Steel, of uniform thickness save at corners, which are of double thickness, being smoothly lapped and riveted. The edges are rolled over a band of steel riveted under the flange. The Legs have renewable Steel Shoes. Patent Steel Wheel with Staggered Spokes. Heavily braced throughout. The most durable and easily handled Barrow made. Steel Charging and other Barrows in variety. Send for handsome Illustrated Barrow and Truck Catalogue No. 6—just out—to

**SYRACUSE CHILLED PLOW CO., Syracuse, N. Y.**

# Just Figure Out

For yourself what you save by using the best plumbago. Here are two cases: One man uses the best goods at 6 cents a pound, and the other a wishy, washy adulteration at 3 cents a pound and cost of shipping added,

## IT WILL LOOK SOMETHING LIKE THIS:

| | |
|---|---|
| 25 pounds of Joseph Dixon's No. 2441 at 6 cents | $1.50 |
| Chipping and cleaning casting, say | 1.00 |
| Total | $2.50 |

## THE OTHER CASE

| | |
|---|---|
| 25 pounds of the adulterated article at 3 cents | $ .75 |
| Chipping and cleaning casting, say | 4.00 |
| Total | $4.75 |

A loss of $2.25 or more than the entire cost of a first-class article in the first place, yet this sort of thing is being done every day in the year, by good foundrymen too. They not only lose money by the operation, but have a second-class piece of work at the best.

◆◆◆◆◆◆◆◆

# Jos. Dixon Crucible Co.

JERSEY CITY, N. J.

Telephone
"Main 5102."

# *We are Search= ing*

Every nook and . .
corner of the . . . .
Foundry World . .
for orders, and . . .
in return . . . . . .
we are getting . . .
our share . . . . . .

## Molding Sand, Fire Brick,

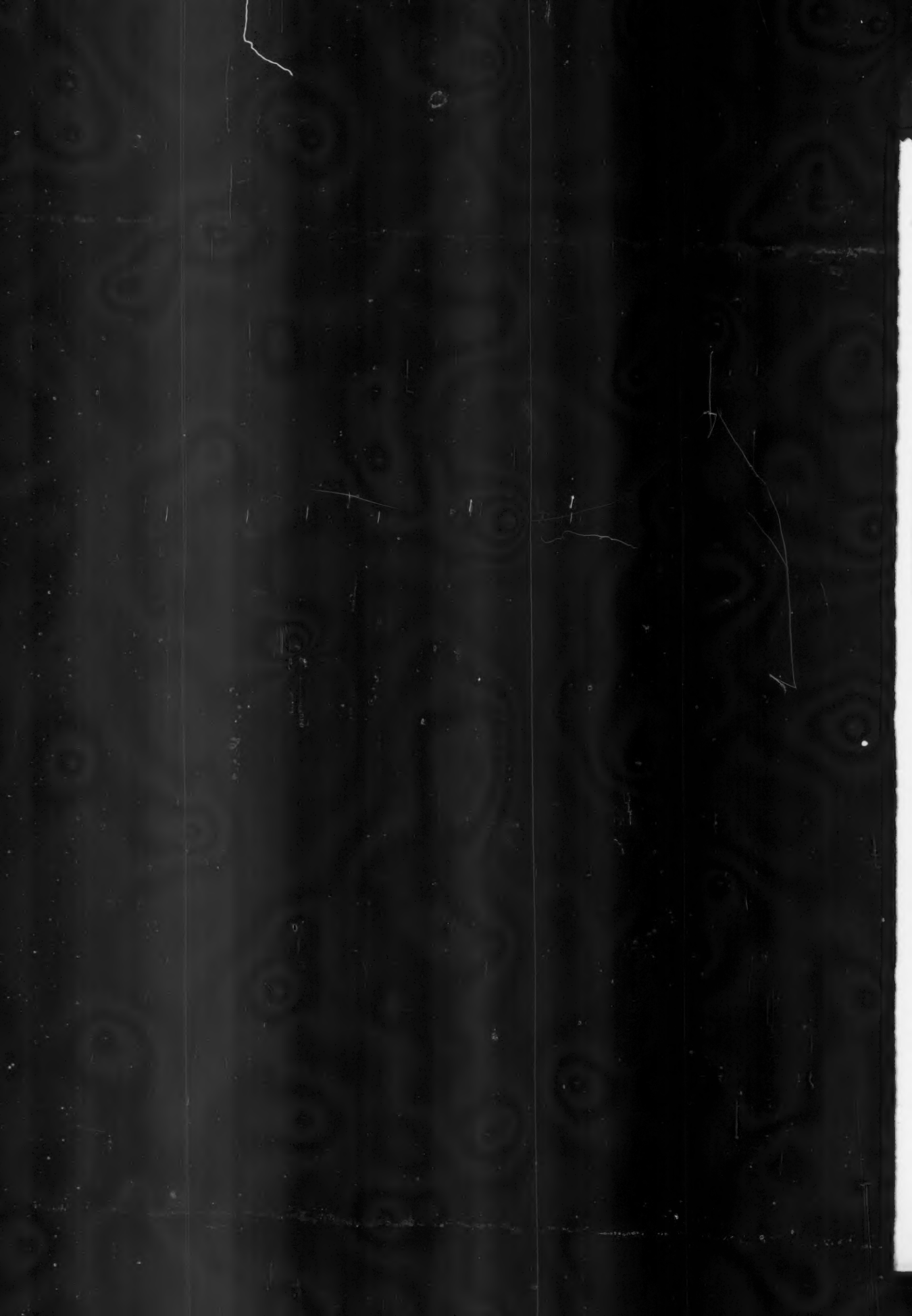
CUPOLA LININGS, FACINGS,
RIDDLES, BRUSHES, BELLOWS
CRUCIBLES and GENERAL . .
FOUNDRY SUPPLIES . . . .

*We handle and keep constantly in stock in our Chicago Yards, a full stock of material to meet the foundrymen's wants at all times, always giving a* **guarantee** *as to quality and price.*

**Write us and let us send you our book containing some valuable information.**

## *The Garden City Sand Co.*

1010 SECURITY BLDG., CHICAGO, ILLS.



# Aluminum

**INGOTS, SHEETS, RODS, WIRE.**

## COWLES No. 1 ALUMINUM ALLOY.

Nearly as light as pure Aluminum, but considerably harder and stronger, also casts much better than pure Aluminum. A fine metal for patterns and models. Supplied in ingots.

## FERRO ALUMINUM.

For use in iron and steel castings.

## MANGANESE COPPER.

A rich alloy of Manganese and copper, from which any desired grade of Manganese Bronze can be made. Supplied in ingots.

## ALUMINUM BRONZE.

Any grade, in ingots.

## MANGANESE BRONZE.

For propeller wheels and other castings. Supplied in ingots.

## SILICON COPPER.

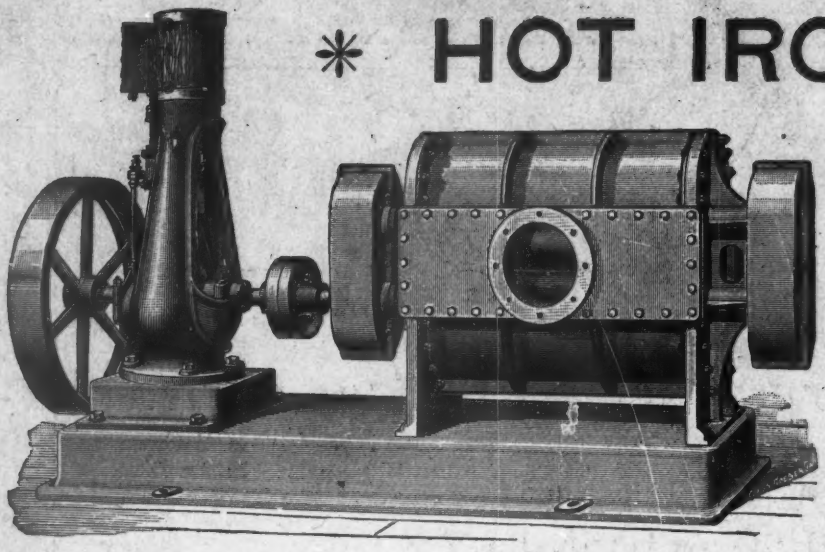
A rich alloy of Silicon and Copper. The addition of from 1½ to 2 lbs. of this alloy to 100 lbs. of copper will insure a SOLID COPPER CASTING. Supplied in ingots.

**Cowles Electric Smelting & Aluminum Co**

**LOCKPORT, N. Y.**

**Correspondence Solicited.**

# * HOT IRON!



That is what runs from a Cupola when the blast is furnished by a

# "Cycloidal" Positive Pressure Blower

The Iron is hot at all stages of the heat, at the latter as well as the first part. **All Foundrymen know how desirable this is.**

**If you want to increase your output and decrease its cost, write to us.**

---

## COLDWATER OIL STOVE CO.

*Manufacturers of*

The All Right Oil Stove,

11 HANCHETT ST.,

COLDWATER, MICH., December 3rd, 1895.

*CONNERSVILLE BLOWER CO.,*
*Connersville, Ind.*

GENTLEMEN:—Yours of Nov. 30th received. Please write up anything you wish in relation to the good workings of the blower and sign our name to it. It fills the bill completely and gives us perfect satisfaction

Yours respectfully,
COLDWATER OIL STOVE CO.

## THE WATTS-CAMPBELL CO.

MANUFACTURERS OF

CORLISS STEAM ENGINES.

NEWARK, N. J., August 6th, 1895.

*THE CONNERSVILLE BLOWER CO.,*
*Connersville, Ind.*

GENTLEMEN:—We have had your blower in operation about one year. It gives us great pleasure to state we are very highly pleased with its performance. It is practically noiseless and there is no sign of weakness in its construction. We shall be pleased to recommend it to anyone in search of a good reliable blower.

Yours respectfully,
THE WATTS-CAMPBELL CO.
*D. T. Campbell, Pres't.*

---

## LELAND & FAULCONER MFG. CO.

MACHINERY AND TOOLS.

*CONNERSVILLE BLOWER CO., Connersville, Ind.* DETROT, MICH., December 16th, 1895.

GENTLEMEN:—We have your No. 5 "Cycloidal" Positive Pressure Blower, which is driven by a 9x9 vertical engine coupled direct, the whole outfit being upon one bed plate.

We are entirely satisfied with it, and were we in the market for a blower, should look no farther but place our order at once for a Connersville "Cycloidal."

We cannot express ourselves too highly in regard to the performance and the merits of your most efficient, economical and satisfactory Blower; and we are confident if you maintain your present standard of excellence, that you will shortly increase the capacity of your plant. Very truly yours,

LELAND & FAULCONER MFG. CO.
*H. M. Leland, Vice President.*

---

**CATALOGUE ON APPLICATION. ESTIMATES CHEERFULLY FURNISHED.**

---

# THE CONNERSVILLE BLOWER CO

## CONNERSVILLE, IND.